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For related information see also *Astronautics*.

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90 ASTROPHYSICS **859**
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION **860**
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance.* For space stations see *15 Launch Vehicles and Space Vehicles.*

92 SOLAR PHYSICS **860**
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION **861**
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine.* For theory see *73 Nuclear and High-Energy Physics.*

GENERAL

99 GENERAL **N.A.**

Note: N.A. means that no abstracts were assigned to this category for this issue.

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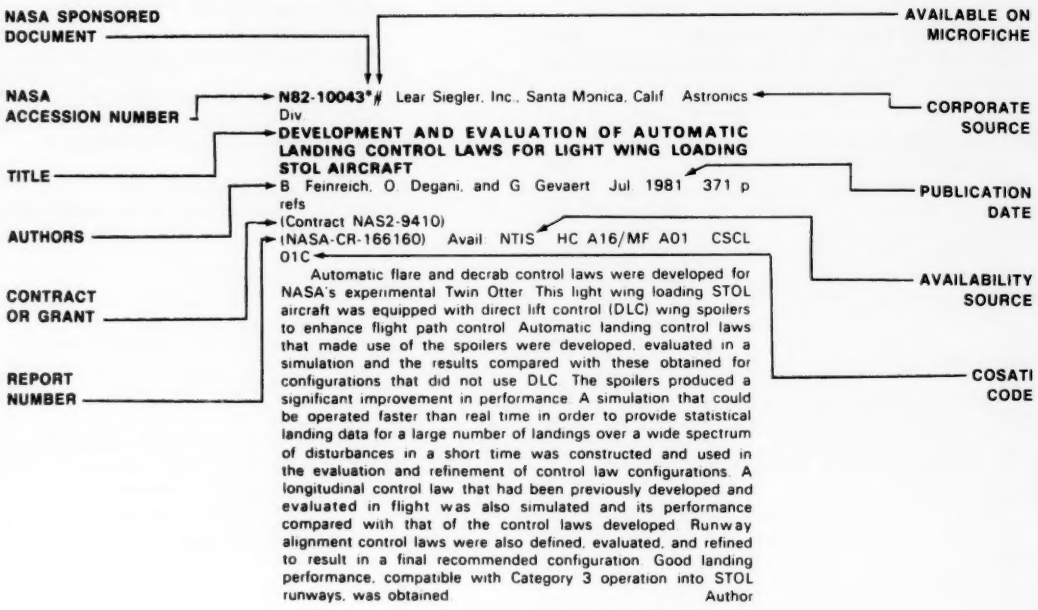
TYPICAL CITATION AND ABSTRACT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N82-10043*# Lear Siegler, Inc., Santa Monica, Calif. Astronics Div
CORPORATE SOURCE
TITLE
DEVELOPMENT AND EVALUATION OF AUTOMATIC LANDING CONTROL LAWS FOR LIGHT WING LOADING STOL AIRCRAFT
PUBLICATION DATE
AUTHORS
B. Feinreich, O. Degani, and G. Gevaert Jul. 1981 371 p refs
CONTRACT OR GRANT
(Contract NAS2-9410)
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REPORT NUMBER
(NASA-CR-166160) Avail: NTIS HC A16/MF A01 CSCL 01C
COSATI CODE
Automatic flare and decrab control laws were developed for NASA's experimental Twin Otter. This light wing loading STOL aircraft was equipped with direct lift control (DLC) wing spoilers to enhance flight path control. Automatic landing control laws that made use of the spoilers were developed, evaluated in a simulation and the results compared with these obtained for configurations that did not use DLC. The spoilers produced a significant improvement in performance. A simulation that could be operated faster than real time in order to provide statistical landing data for a large number of landings over a wide spectrum of disturbances in a short time was constructed and used in the evaluation and refinement of control law configurations. A longitudinal control law that had been previously developed and evaluated in flight was also simulated and its performance compared with that of the control laws developed. Runway alignment control laws were also defined, evaluated, and refined to result in a final recommended configuration. Good landing performance, compatible with Category 3 operation into STOL runways, was obtained.
Author

VOLUME 20 NUMBER 6 MARCH 23, 1982

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N82-15009# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Direction de la Qualite.
THE AIRBUS PROGRAM: QUALITY POLICY [LE PROGRAMME AIRBUS: STRATEGIE DE LA QUALITE]
Georges Sertour 1981 17 p In FRENCH Presented at Congr. EOQC, Jun. 1981
(SNIAS-812-551-101) Avail: NTIS HC A02/MF A01

The organization of a management system for quality which is based on key points, compromise quality/cost, optimization and intention to satisfy certification authorities and customers alike is described. The commercial success of Airbus is reviewed. Marketing and the manufacturing consortium are discussed. The principal phases of product construction and life are treated, (design, procurement, fabrication, inspection, and utilization). Particularities of the management system for quality are revealed at each stage. Author (ESA)

N82-15010# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.
AERONAUTICAL APPLICATIONS OF BONDING [LES APPLICATIONS AERONAUTIQUES DU COLLAGE]
G. Briens 23 Jun. 1981 23 p In FRENCH Presented at Journee d'Information sur le Collage Organisee, Senlis, France, 17 Jun. 1981; sponsored by Federation des Industries Mecaniques et Transformatrices des Metaux and Centre Technique des Industries Mecaniques
(SNIAS-812-551-102; C.42-886) Avail: NTIS HC A02/MF A01

Adhesive bonding agents and techniques and their utilization in aircraft construction are reviewed. Adhesives are classified by their physical presentation, chemical nature, normal application, hardening temperature, and by service temperature and life. The principal structures in which adhesives are used include: honeycomb sandwich constructions, panel stiffeners, reinforcing backing, crack arresters, and laminates. Advantages in bonding assembly are mentioned. Mechanical limitations like shear strength, tensile strength, and resistance to peeling or cleaving, are discussed. The growing importance of bonding in the aerospace industry is emphasized. Author (ESA)

N82-15011# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.
ADVANTAGES AND LIMITATIONS IN THE USE OF DIVERSE MATERIALS FOR AIRCRAFT CONSTRUCTION [ATOUTS ET LIMITES D'EMPLOIS DES DIVERS MATERIAUX UTILISES DANS LA CONSTRUCTION DES CELLULES]
G. Hilaire 1981 37 p In FRENCH Presented at 9th Colloq. Aciers et Alliages Speciaux dans les Ind. Aerospatiales, Le Bourget, France, 11 Jun. 1981
(SNIAS-811-551-104) Avail: NTIS HC A03/MF A01

The properties and applications of steels, light alloys, titanium, and carbon composites are compared. A percentage evaluation of their use in civil aircraft, military aircraft, helicopters, and spacecraft shows trends in airframe materials selection. Criteria for the choice of materials are discussed. Mechanical static characteristics, fatigue behavior, ruggedness, and cost are considered. A more widespread utilization of composites is indicated. Author (ESA)

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N82-15012 Ecole Polytechnique Federale de Lausanne (Switzerland).
INFLUENCE OF THREE-DIMENSIONAL EFFECTS ON THE SUPERSONIC FLOW FIELD AT THE LEADING EDGE OF A TURBOMACHINE CASCADE [EINFLUSS VON DREIDIMENSIONALEN EFFEKTEN AUF DIE VORDERKANTENSTROEMUNG AN UEBERSCHALL-TURBOMASCHINENSCHAUFEN]
Herms Schelle Zurich Juris-Verlag 1980 84 p refs In GERMAN; ENGLISH summary
(EPFL-ITA-9; ISBN-3-260-04851-0) Avail: Issuing Activity

A three-dimensional bi-characteristic method was developed. Results are compared with those of two-dimensional models. Three-dimensional effects are expected to play an important role because of the variation of flow velocity along the turbine radius cascade height. The mathematical model, the system of characteristic equations, the numerical algorithm and the test procedures are discussed. Results of the shock wave position and of the flow characteristics behind the shock as a function of logarithmic pressure function, Laval velocity, entropy, direction of velocity and edge angle show little or no difference between the three-dimensional analysis and a piecewise two-dimensional one. Author (ESA)

N82-15013*# Cincinnati Univ., Ohio. Dept. of Aerospace Engineering and Applied Mechanics.
FLAG-LAG-TORSIONAL DYNAMICS OR EXTENSIONAL AND INEXTENSIONAL ROTOR BLADES IN HOVER AND IN FORWARD FLIGHT Semiannual Progress Report, Jul. - Dec 1981
M. R. M. CrespoDaSilva Dec. 1981 6 p refs
(Grant NAG2-38)
(NASA-CR-165078) Avail: NTIS HC A02/MF A01 CSCL 01A

The differential equations describing the flap-lag-torsional motion of a flexible rotor blade including third-order nonlinearities were derived for hover and forward flight. Making use of the two boundary conditions, those equations were reduced to a set of three integro partial differential equations written in terms of the flexural deflections and the torsional variable. L.F.M.

N82-15014*# Vigyan Research Associates, Inc., Hampton, Va.
SUBSONIC BALANCE AND PRESSURE INVESTIGATION OF A 60-DEG DELTA WING WITH LEADING-EDGE DEVICES (DATA REPORT)
Dhanvada M. Rao and Stephen A. Tingas (North Carolina State Univ., Raleigh) Hampton, Va. NASA. Langley Research Center Nov. 1981 126 p refs
(Contract NAS1-16259)
(NASA-CR-165806) Avail: NTIS HC A07/MF A01 CSCL 01A

The drag reduction potential of leading edge devices on a 60 degree delta wing at high lift was examined. Geometric variations of fences, chordwise slots, pylon type vortex generators, leading edge vortex flaps, and sharp leading edge extensions were tested individually and in specific combinations to improve high-alpha drag performance with a minimum of low-alpha drag penalty. The force, moment, and surface static pressure data for angles of attack up to 23 degrees, at Mach and Reynolds numbers of 0.16 and 3.85 x 10 to the 6th power per meter are documented. E.A.K.

N82-15015*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LOW-SPEED AERODYNAMIC PERFORMANCE OF A HIGH-ASPECT-RATIO SUPERCRITICAL-WING TRANSPORT MODEL EQUIPPED WITH FULL-SPAN SLAT AND PART-SPAN DOUBLE-SLOTTED FLAPS
Harry L. Morgan, Jr. and John W. Paulson, Jr. Dec. 1979 145 p refs
(NASA-TP-1580; L-13201) Avail: NTIS HC A07/MF A01 CSCL 01A

An investigation was conducted in the Langley V/STOL tunnel to determine the static longitudinal and lateral-directional aerodynamic characteristics of an advanced high-aspect-ratio supercritical-wing transport model equipped with a full-span leading-edge slat and part-span double-slotted trailing-edge flaps. This wide-body transport model was also equipped with spoiler and aileron control surfaces, flow-through nacelles, landing gear, movable horizontal tails, and interchangeable wing tips with aspect ratios of 10 and 12. The model was tested with leading-edge slat and trailing-edge flap combinations representative of cruise, climb, takeoff, and landing wing configurations. The tests were conducted at free-stream conditions corresponding to Reynolds numbers (based on mean geometric chord) of 0.97 to 1.63 x 10 to the 6th power and corresponding Mach numbers of 0.12 to 0.20, through an angle-of-attack range of -2 deg to 24 deg and a sideslip-angle range of -10 deg to 5 deg. Author

N82-15016*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
DONBOL: A COMPUTER PROGRAM FOR PREDICTING AXISYMMETRIC NOZZLE AFTERBODY PRESSURE DISTRIBUTIONS AND DRAG AT SUBSONIC SPEEDS
Lawrence E. Putnam May 1979 99 p refs
(NASA-TM-78779; L-12658) Avail: NTIS HC A05/MF A01 CSCL 01A

A Neumann solution for inviscid external flow was coupled to a modified Reshotko-Tucker integral boundary-layer technique, the control volume method of Presz for calculating flow in the separated region, and an inviscid one-dimensional solution for the jet exhaust flow in order to predict axisymmetric nozzle afterbody pressure distributions and drag. The viscous and inviscid flows are solved iteratively until convergence is obtained. A computer algorithm of this procedure was written and is called DONBOL. A description of the computer program and a guide to its use is given. Comparisons of the predictions of this method with experiments show that the method accurately predicts the pressure distributions of boattail afterbodies which have the jet exhaust flow simulated by solid bodies. For nozzle configurations which have the jet exhaust simulated by high-pressure air, the present method significantly underpredicts the magnitude of nozzle pressure drag. This deficiency results because the method neglects the effects of jet plume entrainment. This method is limited to subsonic free-stream Mach numbers below that for which the flow over the body of revolution becomes sonic. Author

N82-15017*# Boeing Commercial Airplane Co., Seattle, Wash. Preliminary Design Dept.
HIGH LIFT SELECTED CONCEPTS Final Report, Aug. 1977 - Jul. 1978
M. L. Henderson Hampton, Va. NASA Aug. 1979 108 p refs
(Contract NAS1-14742)
(NASA-CR-159093) Avail: NTIS HC A06/MF A01 CSCL 01A

The benefits to high lift system maximum life and, alternatively, to high lift system complexity, of applying analytic design and analysis techniques to the design of high lift sections for flight conditions were determined and two high lift sections were designed to flight conditions. The influence of the high lift section on the sizing and economics of a specific energy efficient transport (EET) was clarified using a computerized sizing technique and an existing advanced airplane design data base. The impact of the best design resulting from the design applications studies on EET sizing and economics were evaluated. Flap technology trade studies, climb and descent studies, and augmented stability studies are included along with a description of the baseline high lift system geometry, a calculation of lift and pitching moment when separation is present, and an inverse boundary layer technique for pressure distribution synthesis and optimization. A.R.H.

N82-15018*# Boeing Commercial Airplane Co., Seattle, Wash. Preliminary Design Dept.
NATURAL LAMINAR FLOW AIRFOIL ANALYSIS AND TRADE STUDIES Final Report, Aug. 1977 - Jun. 1978
May 1979 86 p refs
(Contract NAS1-14742)
(NASA-CR-159029; B-7220) Avail: NTIS HC A05/MF A01 CSCL 01A

An analysis of an airfoil for a large commercial transport cruising at Mach 0.8 and the use of advanced computer techniques to perform the analysis are described. Incorporation of the airfoil into a natural laminar flow transport configuration is addressed and a comparison of fuel requirements and operating costs between the natural laminar flow transport and an equivalent turbulent flow transport is addressed. Author

N82-15019*# Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.
CORRELATION OF TRANSONIC-CONE PRESTON-TUBE DATA AND SKIN FRICTION Semiannual Progress Report, May - Oct. 1981
T. D. Reed Oct. 1981 144 p refs
(Grant NAG2-76)
(NASA-CR-165065) Avail: NTIS HC A07/MF A01 CSCL 01A

The distribution of Preston tube pressures within turbulent boundary layers along the surface of a sharp-nosed, ten degree cone was correlated with theoretical values of turbulent skin friction for freestream Mach numbers less than one. The mini-basic computer code, the Wu and Lock computer code, and the STAN-5 computer code were used to analyze the data and to solve the boundary layer conservation equations. The skin friction which results from using Preston tube pressures in the correlation equation, has a rms error of 1.125 percent. It was found that the effective center of the probe is not a constant but increases as the surface distance increases. For a specified unit Reynolds number, the effective center of the probe decreases as the Mach number increases. The variation of the fluid (air) properties across the face of the probe may be neglected for subsonic flows. The possible transverse errors caused by the use of the concept of a vitural origin for the turbulent boundary layer were investigated and found to be negligible. A.R.H.

N82-15020*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPARISON OF TWO AND THREE DIMENSIONAL FLOW COMPUTATIONS WITH LASER ANEMOMETER MEASUREMENTS IN A TRANSONIC COMPRESSOR ROTOR
Rodrick V. Chima and Anthony J. Strazisar 1982 16 p refs Proposed for presentation at the 27th Gas Turbine Conf., London, 18-22 Apr. 1982; sponsored by ASME
(NASA-TM-82777; E-1007) Avail: NTIS HC A02/MF A01 CSCL 01A

A procedure for using an efficient axisymmetric code to generate downstream pressure input for more costly Euler codes is discussed. Two and three dimensional inviscid solutions for the flow within a transonic axial compressor rotor at design speed are compared to laser anemometer measurements at maximum flow and near stall operating points. Computational details of the 2-D axisymmetric stream function solution and the 3-D full Euler solution are described. Relative Mach number contours, shock location, and shock strength as measured and as predicted by the 3-D code are compared. Downstream of the rotor the inviscid computations agree with each other but predict higher pressure ratios than those measured. Euler codes require a downstream pressure as input. Since that pressure controls the computed mass flow and shock system, it must be consistent with an inviscid solution. E.A.K.

N82-15021# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Theoretische Stroemungsmechanik.

COMPUTATION OF SUBSONIC FLOW AROUND AIRFOIL SYSTEMS WITH MULTIPLE SEPARATION

Klaus Jacob 1981 64 p refs In GERMAN; ENGLISH summary

(DFVLR-FB-81-24) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 13,10

A numerical method for computing the subsonic flow around multielement airfoil systems was developed allowing for flow separation at one or more elements. Besides multiple rear separation, short bubbles on the upper surface and cove bubbles can be taken into account. Also, compressibility effects for pure subsonic flow are accounted for. After presentation the method is applied to several examples and improved in some details. Finally the limitations and desirable extensions are discussed. Author

N82-15022# Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 2.

STABILITY MEASURING AND DISPERSION OF SHELLS WITH DIFFERENT LENGTHS OF LOW AERODYNAMIC DRAG TIP [STABILITETSMAETNING OCH SPRIDNINGS-SKJUTNINGAV PROJEKTILER MED OLIKA LAANG LAAGM-OTSTAANDSSPETS. MALFOM 4.4831 ETAPP 6]

Sven Nordstroen Jul. 1981 68 p refs In SWEDISH; ENGLISH summary

(FOA-C-20418-D2) Avail: NTIS HC A04/MF A01

All four types had sufficient static (gyroscopic) as well as dynamic stability, except the shortest type at subsonic velocity, where three of six rounds were dynamically unstable, indicating a state of equilibrium at a yaw amplitude of approx. 3 deg. The range increases with increasing nose length. The dispersion is almost independent of the nose length and is of the same magnitude as that of the original HE shell. The only exception is the projectile with the next longest nose at the highest velocity, where an assumed big initial yaw amplitude in some rounds has caused a decrease of the mean range and approx. 65% greater dispersion. A gain in range of 15 to 20 percent relative to the original shell should be obtainable by decreasing the bearing length and increasing the nose length to 3.5 - 4.0 caliber. The short bearing length caused no greater initial yaw than what was measured in several tests with earlier types. A.R.H.

N82-15023*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md. Flight Performance Branch of the Sounding Rockets Div.

DEVELOPMENT OF THE ARIES PARACHUTE SYSTEM

William B. Pepper (Sandia National Labs., Albuquerque) and Francis M. Collins 1981 11 p refs Presented at the 7th AIAA Aerodyn. Decelerator and Balloon Technol. Conf., San Diego, Calif., 21-23 Oct. 1981

(Contract DE-AC04-76DP-00789)

(NASA-TM-84082; DE81-012161; SAND-81-0208C; CONF-811002-1) Avail: NTIS HC A02/MF A01 CSCL 01A

The design and testing of a two-stage parachute system to recover a space telescope weighing up to 2000 pounds is described. The system consists of a 15-ft dia ribbon parachute reefed to 50% for 10 seconds and a 73-ft dia paraform or cross second stage reefed to 10% for 10 seconds. The results of eight drop tests and one operational rocket launched flight and recovery are presented. A successful operational recovery of a 1600-lb NASA space telescope was conducted. The payload was launched by a second stage Minuteman rocket to an altitude of about 300 miles above sea level. DOE

N82-15024# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Inst. fuer Flugmechanik.

DESIGN, PERFORMANCE, AND SIMILARITY LAWS OF SUBSONIC PARACHUTES

C. Saliais Bonn Bundesministerium der Verteidigung 1981 39 p refs In GERMAN; ENGLISH summary

(Contract DEA-AF-68-G-7415)

(BMVg-FBWT-81-4) Avail: NTIS HC A03/MF A01; DOK-ZENTBw, Bonn DM 30

The performance data of ribless subsonic parachutes were determined theoretically and experimentally, with special consideration of scale effects. A theoretical model for parachute behavior during opening was developed, showing satisfactory agreement with experiments on filling force, filling time and load velocity. The Froude number Fr and the massparameter mu/sub T/, i.e., the ratio of the total mass to that of the displaced air, are identified as the most important dimensionless numbers. The parachute strength and stability were also tested and the test facilities and equipment are described. All results and those of similar experiments by other groups were stored in a data bank. Author (ESA)

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

N82-15025*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

NASA AVIATION SAFETY REPORTING SYSTEM Quarterly Report

Sep. 1981 57 p refs Prepared in cooperation with Battelle Columbus Labs., Mountain View, Calif.

(NASA-TM-81274; A-8504; QR-13) Avail: NTIS HC A04/MF A01 CSCL 01C

Aviation safety reports that relate to loss of control in flight, problems that occur as a result of similar sounding alphanumerics, and pilot incapacitation are presented. Problems related to the go around maneuver in air carrier operations, and bulletins (and FAA responses to them) that pertain to air traffic control systems and procedures are included. S.L.

N82-15026# Research Inst. of National Defence, Linkoeping (Sweden). Huvudavdelning 3.

DETECTION OF OBSTACLES BY LOW FLYING AIRCRAFT

Dietmar Letalick Aug. 1981 42 p refs

(FOA-C-30227-E1) Avail: NTIS HC A03/MF A01

A model which calculates reflection from cylindrical obstacle surfaces, e.g., power cables is presented. Measurements of reflection of 10.6 micron radiation from various types of wires, cables and framework are reported. The measurements were performed in the laboratory using a CO2 laser and direct detection, with the targets a few meters away. Detection at distances of 500 and 1100 m using a coherent laser was also performed. Calculations of detection range for typical situations indicate that detection at km distances is possible. Author (ESA)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications*.

N82-15027*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va.
AUTOMATED PILOT ADVISORY SYSTEM Final Report
John L. Parks, Jr. and James G. Haidt (Research Triangle Inst., N.C.) Nov. 1981 184 p refs
(NASA-TM-73296) Avail: NTIS HC A09/MF A01 CSCL 17G

An Automated Pilot Advisory System (APAS) was developed and operationally tested to demonstrate the concept that low cost automated systems can provide air traffic and aviation weather advisory information at high density uncontrolled airports. The system was designed to enhance the see and be seen rule of flight, and pilots who used the system preferred it over the self announcement system presently used at uncontrolled airports. S.L.

N82-15028# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Flugzeugsteuerung und -regelung.
ANALYSIS OF TWO AIR TRAFFIC SAMPLES IN THE TERMINAL AREA OF FRANKFURT AM MAIN, 3 AUGUST 1979
Manfred Schubert and Uwe Voelckers Jun. 1981 119 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-740)
(DFVLR-Mitt-81-17; ESA-TT-740) Avail: NTIS HC A06/MF A01; DFVLR, Cologne DM 26.50

The random deviation of air traffic arrivals in the terminal area, the different structure of standard arrival routes and a multitude of operational procedures affect the overall planning of arrival traffic. The necessary time-balance between arrivals can be established partly by coordination between approach control and enroute controller and by flight path planning within the terminal area. The effect of the applied control procedures on arrival distributions, traffic handling, traffic sequence, and traffic density in the terminal area are analyzed for the recorded air traffic periods on August 3rd, 1979. The findings are discussed in comparison with the results of a proceeding analysis of approach traffic on August 4th, 1978. Author

N82-15029# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Arteilung flugzeugsteuerung und -regelung.
ANALYSIS OF TWO AIR TRAFFIC SAMPLES IN THE TERMINAL AREA OF FRANKFURT AM MAIN, 4 AUGUST 1978
Uwe Voelckers, Manfred Schubert, and Albrecht Seyfried Jun. 1981 128 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-739)
(DFVLR-Mitt-81-12; ESA-TT-739) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 28

Two 'arrival peaks' in the near terminal area of Frankfurt/Main were analyzed. Extensive computer-programs were used to combine the recorded data from seven different data-sources. The traffic analysis includes the quantitative evaluation of traffic density, studies of air traffic distributions relating to space and time, the investigation of air traffic control procedures, the determination of the approach control planning strategies and a basic investigation of traffic vectoring in the terminal area. The two traffic samples are discussed and compared. A.R.H.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

N82-15030*# Boeing Vertol Co., Philadelphia, Pa.
XV-15 TILT ROTOR FLY-BY-WIRE COLLECTIVE CONTROL DEMONSTRATOR DEVELOPMENT SPECIFICATIONS Final Report, Mar. 1981
R. J. Meuleners Mar. 1981 34 p
(Contract NAS2-10160)
(NASA-CR-166262; D210-11819-1) Avail: NTIS HC A03/MF A01 CSCL 01C

A fly by wire system in the collective control system for XV-15 Tilt Rotor Research Aircraft was evaluated. The collective control system was selected because it requires a system tracking accuracy between right and left rotors of approximately 0.1%. The performance characteristics of the collectors axel provide typical axis control response data. The demonstrator is bread boarded as a dual system instead of the triplex system. E.A.K.

N82-15031*# Kansas Univ. Center for Research, Inc., Lawrence. Flight Research Lab.
A THEORETICAL INVESTIGATION OF WING ROCKING Semiannual Status Report, 1 Jul. - 31 Dec. 1981
C. Edward Lan and Chung-Hao Hsu 31 Dec. 1981 36 p refs
(Contract NAG1-134)
(NASA-CR-165058) Avail: NTIS HC A03/MF A01 CSCL 01A

A semiempirical method to predict vortex breakdown effects on aerodynamic characteristics of slender wings is described. The method is based on Polhamus' method of suction analogy. Both longitudinal and lateral directional characteristics are predicted. S.L.

N82-15032*# Connecticut Univ., Storrs.
STOCHASTIC CONTROL AND IDENTIFICATION OF HELICOPTER DYNAMIC MODES Semiannual Progress Report, 1 Jul. - 31 Dec. 1981
J. Molusis and Y. Bar-Shalom Dec. 1981 35 p refs
(Grant NAG2-72)
(NASA-CR-165057) Avail: NTIS HC A03/MF A01 CSCL 01C

Simulations of ground resonance model with constant and periodic coefficient measurement models were made. The extended Kalman filters, as an identification method, and it's convergence properties were reviewed. Free response data for identification of damping for ground resonance was used and the ground resonance parameter identification results for constant coefficient and periodic coefficient measurement models are presented. S.L.

N82-15033*# Boeing Co., Seattle, Wash.
SELECTED ADVANCED AERODYNAMIC AND ACTIVE CONTROL CONCEPTS DEVELOPMENT Summary Report, 10 Aug. 1977 - 9 Aug. 1979
Washington, D.C. NASA Jan. 1980 56 p refs
(Contract NAS1-14742)
(NASA-CR-3220; D6-46705) Avail: NTIS HC A04/MF A01 CSCL 01C

A summary is presented of results obtained during analysis, design and test activities on six selected technical tasks directed at exploratory improvement of fuel efficiency for new and derivative transports. The work included investigations into the potential offered by natural laminar flow, improved surface coatings and advanced high lift concepts. Similar investigations covering optimum low-energy flight path control, integrated application of active controls and evaluation of primary flight control systems reliability and maintenance are also summarized. Recommendations are included for future work needed to exploit potential advancements. Author

N82-15034*# Boeing Commercial Airplane Co., Seattle, Wash.
DEVELOPMENT OF INTEGRATED PROGRAMS FOR

AEROSPACE-VEHICLE DESIGN (IPAD) - IPAD USER REQUIREMENTS Final Report
G. L. Anderton Mar. 1979 103 p
(Contract NAS1-14700)
(NASA-CR-2985; D6-IPAD-70013-D) Avail: NTIS HC A06/MF A01 CSCL 01C

Results of a requirements analysis task for Integrated Programs for Aerospace Vehicle Design (IPAD) are presented. User requirements which, in part, will shape the IPAD system design are given. Requirements considered were: generation, modification, storage, retrieval, communication, reporting, and protection of information. Data manipulation and controls on the system and the information were also considered. Specific needs relative to the product design process are also discussed. M.D.K.

N82-15035# Textron Bell Helicopter, Fort Worth, Tex.
HELICOPTER LANDING GEAR DESIGN AND TEST CRITERIA INVESTIGATION Final Report
David Crist and L. H. Symes Aug. 1981 192 p refs
(Contract DAAK51-79-C-8011; DA Proj. 1L1-62209-AH-76)
(AD-A105512; BHT-699-099-026;
USAAVRADCOM-TR-81-D-15) Avail: NTIS HC A09/MF A01 CSCL 01/3

This program was an investigation of the criteria relating to helicopter landing gears. A computerized literature search was conducted and a bibliography is included in this report. Existing criteria were reviewed and conflicts were identified. An analysis of survivable Army helicopter accidents was performed. The results were used to formulate a tentative criterion. A design study was conducted to evaluate the practicality of the tentative criteria. This investigation compared wheel and skid-type landing gears designed to the tentative criteria and to MIL-S-8698. A crashworthiness analysis of the tentative criteria tailwheel tricycle gear was performed. Weights and landing loads were calculated. A cost comparison was made between tailwheel tricycle gears designed to the two criteria. The gear designed to the new criteria was cost-effective. The results of the investigation were used to modify the tentative criteria and recommendations were made for a new helicopter landing gear military specification and for changes to the existing criteria. Author (GRA)

N82-15036# Fraunhofer-Inst. fuer Informations- und Datenverarbeitung, Karlsruhe (West Germany).
SURVEY OF THE OBSERVER'S PERFORMANCE WITH REMOTELY PILOTED VEHICLES
H. Mutschler Bonn Bundesministerium der Verteidigung 1981 61 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium der Verteidigung
(BMVg-FBWT-81-3) Avail: NTIS HC A04/MF A01; DOK-ZENTBw, Bonn DM 30

The parameters affecting observer performance in air to surface target recognition with remotely piloted vehicles (RPV) under reconnaissance mission conditions and using television sensors are surveyed. The parameters are divided into scene, system and observer parameters. Contrast and context are identified as the most important scene parameters. The system is defined as the RPV and the television system. Image quality, monitor times and resolution are of prime importance and their dependence on flight conditions and the sensor system are discussed. The observer parameters concern the sensory and cognitive capabilities of the observer. A critical evaluation of the combined effects of these parameters leads to the conclusion that RPV operation is capable of only rough and incomplete target recognition. Improvements are expected from image storage applications and, primarily, from image quality improvements. Author (ESA)

N82-15037# Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
ESTIMATION METHODS FOR THE DETERMINATION OF DYNAMIC RESPONSES OF ELASTIC AIRCRAFT
S. Vogel Bonn Bundesministerium der Verteidigung 1981 123 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium der Verteidigung
(BMVg-FBWT-81-6) Avail: NTIS HC A06/MF A01; DOK-ZENTBw, Bonn DM 40

A method for establishing the dynamic response of an elastic aircraft structure to external excitation, such as random gusts or arbitrarily timed maneuver loads is presented. The solution is based on an analytic representation of the admittance functions by partical fractions. The time response frequency dependence of the aerodynamic forces induced by motion are approximated to allow analytical solutions which are shown to be as accurate, but more economical, than more elaborate numerical Fourier methods. Elasticity is introduced through eigenfrequencies and generalized masses. Several examples are shown which also include the influence of control systems and of elasticity on loads and accelerations. Depending on the quality of the structural and aerodynamical input, the method may be used as an estimation method or as an inexpensive approximation method for all dynamic problems in which elasticity, control systems and excitation time lag effects play a role. Author (ESA)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N82-15038# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Flugzeugsteuerung und -regelung.
INTEGRATION OF A DIGITAL AIR DATA COMPUTER INTO THE TEST AIRCRAFT HFB-320
Rainer Dombrowsky and Volkmar Adam May 1981 62 p refs In GERMAN; ENGLISH summary
(DFVLR-Mitt-81-09) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 16

The digital air data computer HG 280 D5 is presented with its essential characteristics, output signals, and failure test facilities. Integration with the measuring equipment of the test aircraft HFB 320 as well as the hard and software developed for the signal interface of the onboard computer are described. The system processes flight data, such as rate of climb and descent, and altitude. Author (ESA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power*, *28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N82-15039*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPUTER PROGRAM FOR AERODYNAMIC AND BLADING DESIGN OF MULTISTAGE AXIAL-FLOW COMPRESSORS
James E. Crouse and William T. Gorrell Dec. 1981 105 p refs Prepared in cooperation with Army Aviation Research and Development Command, St. Louis, Mo.
(NASA-TP-1946; AVRADCOM-TR-80-C-21; E-280) Avail: NTIS HC A06/MF A01 CSCL 21E

A code for computing the aerodynamic design of a multistage axial-flow compressor and, if desired, the associated blading geometry input for internal flow analysis codes is presented. Compressible flow, which is assumed to be steady and axisymmetric, is the basis for a two-dimensional solution in the meridional plane with viscous effects modeled by pressure loss coefficients and boundary layer blockage. The radial equation of motion and the continuity equation are solved with the streamline curvature method on calculation stations outside the blade rows. The annulus profile, mass flow, pressure ratio, and rotative speed are input. A number of other input parameters specify and control the blade row aerodynamics and geometry. In particular, blade element centerlines and thicknesses can be specified with fourth

degree polynomials for two segments. The output includes a detailed aerodynamic solution and, if desired, blading coordinates that can be used for internal flow analysis codes. Author

N82-15040*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EFFECT OF FUEL INJECTOR TYPE ON PERFORMANCE AND EMISSIONS OF REVERSE-FLOW COMBUSTOR
Carl T. Norgren and Stephen M. Riddlebaugh Dec. 1981 40 p refs
(NASA-TP-1945; E-556) Avail: NTIS HC A03/MF A01 CSCL 21E

The combustion process in a reverse-flow combustor suitable for a small gas turbine engine was investigated to evaluate the effect of fuel injector type on performance and emissions. Fuel injector configurations using pressure-atomizing, spill-flow, air blast, and air-assist techniques were compared and evaluated on the basis of performance obtained in a full-scale experimental combustor operated at inlet conditions corresponding to takeoff, cruise, low power, and idle and typical of a 16:1-pressure-ratio turbine engine. Major differences in combustor performance and emissions characteristics were experienced with each injector type even though the aerodynamic configuration was common to most combustor models. Performance characteristics obtained with the various fuel injector types could not have been predicted from bench-test injector spray characteristics. The effect of the number of operating fuel injectors on performance and emissions is also presented. Author

N82-15041*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
INTERACTIVE-GRAPHIC FLOWPATH PLOTTING FOR TURBINE ENGINES
Robert R. Corban Nov. 1981 51 p refs
(NASA-TM-82756; E-1074) Avail: NTIS HC A04/MF A01 CSCL 21E

An engine cycle program capable of simulating the design and off-design performance of arbitrary turbine engines, and a computer code which, when used in conjunction with the cycle code, can predict the weight of the engines are described. A graphics subroutine was added to the code to enable the engineer to visualize the designed engine with more clarity by producing an overall view of the designed engine for output on a graphics device using IBM-370 graphics subroutines. In addition, with the engine drawn on a graphics screen, the program allows for the interactive user to make changes to the inputs to the code for the engine to be redrawn and reweighed. These improvements allow better use of the code in conjunction with the engine program. T.M.

N82-15042 Ecole Polytechnique Federale de Lausanne (Switzerland). Inst. de Thermique Appliquee.
AEROELASTICITY IN TURBOMACHINES
P. Suter, ed. Zurich Juris-Verlag 1981 487 p refs Proc. of 2nd Intern. Symposium, Lausanne, Switzerland, 8-12 Sep. 1980
(EPFL-ITA-10; ISBN-3-260-04871-5) Avail: Issuing Activity

The understanding and prevention of failures in turbomachines caused by aeroelastic blade vibrations is considered. Calculation of subsonic cascades, cascade tests, vibration measurements and annular cascade tests, unsteady supersonic flow in cascades, and theoretical methods are discussed. For individual titles, see N82-15043 through N82-15070.

N82-15043 Akademiya Nauk SSSR, Novosibirsk. Inst. of Hydrodynamics.
CALCULATION OF HYDRODYNAMIC INTERACTION OF THE ARBITRARY PROFILE CASCADES IN THE FLOW OF IDEAL LIQUID
V. E. Saren and V. A. Yudin *In* Ecole Polytechnique de Lausanne Aeroelasticity in Turbomachines 1981 p 17-26 refs (For primary document see N82-15042 06-07)
Avail: Issuing Activity

The influence of blade shape on the intensity of cascades potential interaction and the influence of vortex wakes on the forces emerging on the downstream cascade blades are examined. Hydrodynamic interaction of two mutually moving blade cascades is based, first, on the displacement of each cascade in nonuniform potential flow in the neighborhood of the adjacent cascade (potential interaction) and, second, on the intersection of vortex wakes due to boundary layer coming off the upstream cascade blades (vortex interaction) by the downstream cascade blades. The contribution of either mechanism to nonstationary lift depends presumably on the axial distance between cascades and on cascade blade shape. Comparison results of the calculations of potential interaction and the interaction including vortex wakes with experimental data show that both models correctly reflect the qualitative nature of the nonstationary force to time relationship. Author (ESA)

N82-15044 Tennessee Univ., Tullahoma. Space Inst.
AERODYNAMIC ANALYSIS OF CASCADED AIRFOILS IN UNSTEADY ROTATIONAL FLOW
John E. Caruthers *In* Ecole Polytechnique de Lausanne Aeroelasticity in Turbomachines 1981 p 31-64 refs (For primary document see N82-15042 06-07)
Avail: Issuing Activity

An analytical numerical method for the prediction of wake and vibration-induced unsteady pressure distributions acting on thick, cambered airfoils in cascade is presented. The unsteady method is two dimensional, rotational and compressible. The unsteady flow field is treated as a small nonpotential perturbation about a mean nonlinear potential flow field. The unsteady velocity field is further split into potential and nonpotential parts. Linearized field equations are obtained for the perturbation entropy, vorticity, rotational velocity, and perturbation potential which are solved successively, using a combination of analytical and numerical methods. The pressure distributions on the airfoil surfaces are obtained after solution of the field equations from the integrated linearized momentum equation. Comparisons are made with results for rigid body translation of a 20% thick double circular arc airfoil and for flat plate cascades. Computations are also made for wake gust excitation of a cambered compressor stator.
Author (ESA)

N82-15045 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany). Inst. fuer Aeroelastik.
UNSTEADY PRESSURE DISTRIBUTIONS IN A CASCADE TAKING INTO ACCOUNT PROFILE THICKNESS AND STEADY CIRCULATION
V. Carstens *In* Ecole Polytechnique de Lausanne Aeroelasticity in Turbomachines 1981 p 65-83 refs (For primary document see N82-15042 06-07)
Avail: Issuing Activity

Based on the assumption of an inviscid incompressible flow, the Martensen procedure for calculating unsteady pressure and lift on harmonically oscillating cascades with arbitrarily shaped profiles is described. Application of this procedure then allows the description of parameter interaction in a very complicated, but linear integral equation. Numerical calculations were performed for bending oscillations with the two standard profiles NACA 0012 and NACA 8412. The results for pressure distributions are presented, showing the influence of reduced frequency, turning angle and profile shape. The sharp increase in unsteady blade loading when the reduced frequency is doubled accompanied by a phase shift between real and imaginary parts is revealed. It seems that aerodynamic damping represented by the imaginary part of the pressure, increases with growing turning angle, whereas the real part remains nearly constant. Author (ESA)

N82-15046 Cambridge Univ. (England). Dept. of Engineering.
FORCE AND MOMENT COEFFICIENTS FOR HIGH DEFLECTION CASCADES
D. S. Whitehead and R. J. Grant (Central Electricity Generating Board, Southampton, England) *In* Ecole Polytechnique de Lausanne Aeroelasticity in Turbomachines 1981 p 85-127 refs Sponsored by Rolls Royce Ltd. (For primary document see N82-15042 06-07)
Avail: Issuing Activity

A computer program using a finite element approach for the prediction of force and moment coefficients for the vibration of compressor and turbine blades having a large amount of deflection of the mean flow is explained. The program is limited to subsonic inlet and outlet flows (but can deal with local supersonic patches) and to flow without inlet vorticity and without

shock waves. In order to deal with the effects of camber, incidence, or blade thickness, the unsteady flow is assumed to be a small perturbation of a steady flow with substantial deflection of the fluid as it passes through the cascade. For blades which have substantial camber and thickness, as is usual with turbine blades, it is necessary to use a field method of calculation; hence finite elements. Results for the moment coefficients on a turbine cascade show good agreement with experiment. Author (ESA)

N82-15047 Tokyo Univ. (Japan). Inst. of Space and Aeronautical Sciences.

AERODYNAMIC RESPONSE OF A BLADE IN PITCHING OSCILLATION WITH PARTIAL AND FULL SEPARATION

H. Tanaka, I. Fujimoto, and S. Ishii *In* Ecole Polytechnique de Lausanne Aeroelasticity in Turbomachines 1981 p 129-142 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

The aerodynamic responses of a blade in pitching oscillation with separation bubble and trailing edge separation are analyzed, and the mechanism of energy transfer between the oscillating blade and the air flow is elucidated. In the state of partial separation and leading edge separation, the aerodynamic response of a Goe801 model airfoil vibrating in pitching motion around a midchord of the blade was observed in a blowdown low speed wind tunnel. The dynamic pressure distribution along the blade surface was measured. By considering physical phenomena on the blade surface, it is understood how the phase shift of the unsteady pressure on the blade surface is affected by the deformation of the pressure wave caused by the movement of the reattaching point of the separation bubble and the separation point of trailing edge separation. Author (ESA)

N82-15048 Ecole Polytechnique Federale de Lausanne (Switzerland).

DAMPING FOR TURBOMACHINE BLADE VARIATIONS IN SUBSONIC FLOW

G. S. Pisarenko, A. A. Kaminer, V. A. Balalayev, N. Y. Nastenko, A. L. Stelmach, and A. V. Dunayev *In its* Aeroelasticity in Turbomachinery 1981 p 151-161 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

The reduction of dynamic stresses in turbomachine blades through an increase in aerodynamic damping of blade vibration is discussed. The influence of camber and stagger angle are investigated. An aeroelastic damping analysis for the case of stalled flow is presented. An experimental investigation of aerodynamic damping for planar bending and torsional vibrations of a flat cascade of model blades was carried out. In the range of camber variation from 0.025 to 1.0 dependence turns out not to be substantial; increased aerodynamic damping that never exceeds 10 to 15% accompanies an increase in camber. The influence of stagger angle on damping is also revealed to be relatively slight for angle variations from 0 to 60 deg.

Author (ESA)

N82-15049 Toshiba Research and Development Center, Kawasaki (Japan). Research and Development Center.

SELF EXCITED FLOW OSCILLATION IN THE LOW PRESSURE STEAM TURBINE CASCADE

T. Araki, Y. Okamoto, and F. Ohtomo *In* Ecole Polytechnique de Lausanne Aeroelasticity in Turbomachines 1981 p 171-186 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

The problem of unsteady flow in a turbine cascade with subsonic inlet and supersonic outlet flow was approached through experiments. The type of flow considered occurs at the tip of the last stages of low pressure steam turbine rotors. Experiments were made on a linear cascade over a range of outlet Mach numbers up to 1.8. The measurements included unsteady flow visualization by the Schlieren method and time traces of pressure on the blade surface by transducers on nonoscillating and oscillating blades. In addition, unsteady aerodynamic moments were measured. Results show that the transonic flow field at the tip section of the rotor blades of large steam turbines is steady, operating at rated conditions. Operating under partial load, the steady flow breaks down. Aerodynamic damping in pitching motion for unsteady flow conditions is negative, leading to the possibility that self excited vibration exists in the case of a free standing blade. Author (ESA)

N82-15050 Notre Dame Univ., Ind. Dept. of Aerospace and Mechanical Engineering.

STABILITY AND FLUTTER ANALYSIS OF TURBINE BLADES AT LOW SPEED

T. J. Akai and H. Atassi *In* Ecole Polytechnique de Lausanne Aeroelasticity in Turbomachines 1981 p 187-201 refs (For primary document see N82-15042 06-07)

(Contract F49620-76-C-0014)

Avail: Issuing Activity

An aeroelastic analysis for highly loaded turbine blades at low speed is carried out for various vibratory modes. These include pure bending and torsion as well as coupled oscillatory modes. The analysis is based on a complete aerodynamic theory which fully accounts for the blade geometry, flow conditions and cascade parameters. A damping coefficient simulating structural damping is also included. The results clearly show that classical flutter can occur for low speed turbine cascades at typical operating conditions. This is directly attributable to high blade loading and thickness. Author (ESA)

N82-15051 Akademiya Nauk SSSR, Novosibirsk. Inst. of Hydrodynamics.

CALCULATION OF QUASI-STATIONARY AERODYNAMIC FORCE ACTING ON A CASCADE OF OSCILLATING AIRFOILS IN SUBSONIC FLOW

V. B. Kurzin and V. P. Ryabchenko *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 203-210 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

Nonstationary aerodynamic characteristics of the cascade of thin airfoils in a subsonic gas flow are investigated showing that the influence of gas compressibility on their behavior can be characterized by two parameters: Mach number M and the wave number K. For the cascade of arbitrary airfoils, a theoretical statement of this problem for K tends to zero is considered; here nonstationary aerodynamic characteristics of the cascade are described well by their quasi-stationary approximation. A mathematical model of the nonstationary ideal gas flow at subsonic velocities through an arbitrary airfoil cascade in a quasi-stationary state is formulated. In accordance with the model, functions for the velocity potential wholly define the nonstationary gas flow through the cascade in a quasi-stationary approximation at any time moment. The determination problems for these functions are solved, using Chaplygin's approximation. Author (ESA)

N82-15052 Ecole Polytechnique Federale de Lausanne (Switzerland). Inst. de Thermique Appliquee.

NUMERICAL EXPERIMENTS ON UNSTEADY FLOWS THROUGH VIBRATING CASCADES

Maurizio Pandolfi *In its* Aeroelasticity of Turbomachines 1981 p 211-228 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

A numerical approach is presented for computing the inviscid compressible two-dimensional unsteady flow in a vibrating cascade. The full Euler equations are considered and no restrictive assumptions are required about geometry of the blading. The analysis is confined to subsonic flows. The modeling of the boundaries and the numerical methodology is described. Particular attention is paid to the explicit treatment of the wake behind the blade during the unsteady flow. Checks on the accuracy of the computations are made. Calculation results on the steady shockless transonic flow in an impulse cascade, where the exact solution is available, show acceptable agreement at least for the space-like discretization. Further evaluation of accuracy is hindered by a lack of benchmark solutions with which to compare. Author (ESA)

N82-15053 Ecole Polytechnique Federale de Lausanne (Switzerland).

COMPUTER AIDED INVESTIGATION OF TURBOMACHINE AERODYNAMICS AND AEROELASTICITY

S. M. Belotserkovskii, A. S. Volmir, V. V. Kuleshov, M. I. Nisht, G. U. Stepanov, and R. M. Ejodorov *In its* Aeroelasticity of Turbomachines 1981 p 229-249 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

Computer aided solutions of aeroelasticity problems related to turbomachines are presented. A synthesis of numerical methods from nonstationary aerodynamics and elasticity theory are employed. Solutions derive from an understanding of general characteristics and aerodynamic loads acting on each turbomachine blade while taking into account the interference of the blades and blade rows. Aerodynamic stationary characteristics, aerodynamic derivatives at various values of the vibration frequencies, and aerodynamic characteristics with arbitrary dependence of the kinematic parameters on time were investigated. Elastic deformation of blade and blade/disk systems is explained. A flow chart for the computerized evaluation of these phenomena is shown, the results of which support a turbomachine aeroelasticity mathematical model. Author (ESA)

N82-15054 Mitsubishi Heavy-Industries Ltd., Nagasaki (Japan). Nagasaki Technical Inst.

ON THE NUMERICAL ANALYSIS OF STALL FLUTTER IN TURBINE CASCADES

S. Takahara, T. Adachi, and Y. Kadoya *In* Ecole Polytechnique de Lausanne Aerolasticity of Turbomachines 1981 p 251-262 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

A numerical method using a triangular finite element mesh pattern is applied in order to solve the problem of unsteady stalled flow through a turbine cascade. The flow in the blade-to-blade plane is assumed to be viscous, and in addition, the friction drag on the blade surface is considered. The basic equations for two-dimensional compressible viscous flow are described. Boundary conditions and a vibration condition are also explained. Numerical results for low pressure end blades of a steam turbine are compared with flutter test data on aerodynamic damping and satisfactory agreement is obtained between calculation and experiment. Author (ESA)

N82-15055 Imperial Coll. of Science and Technology, London (England).

A METHOD FOR FORCE DETERMINATION FROM VIBRATION RESPONSE MEASUREMENTS

D. J. Ewins and B. Hillary *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 263-283 refs Sponsored by Rolls Royce Ltd. (For primary document see N82-15042 06-07)

Avail: Issuing Activity

Dynamic force determination from response measurements was studied numerically and experimentally. Application to turbomachine blades undergoing steady or transient vibration is considered. In theory, the case of harmonic excitation and response is expressed as an inverse input/output equation. A cantilever beam and an isolated turbomachine blade were used as test pieces for the experimental study. Results show that application of the pseudoinverse force determination method is subject to a form of conditioning in the region of the fundamental mode. However, the results of tests on an actual compressor blade suggest that with very accurate dynamic modeling of the test structure and careful curve fitting this method is feasible, using current techniques and equipment. Author (ESA)

N82-15056 Brown, Boveri and Co., Ltd., Baden (Switzerland).

CONTROL OF VIBRATION IN AEROELASTIC CASCADE EXPERIMENTS

A. Krischner, B. Fosco, and E. Muller *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 285-295 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

The aeroelastic behavior of an annular, transonic turbine cascade with three degrees of freedom and an electromagnetic excitation system was investigated. Excitation and vibration control which allows measurement of effective damping in the stable operating domain of the cascade is discussed. The vibration control system demonstrates its capability to maintain preset vibration amplitudes and interblade phase angles throughout the resonance range if sufficient damping is present. Author (ESA)

N82-15057 New South Wales Univ., Kensington (Australia). School of Mechanical and Industrial Engineering.

STABILITY ANALYSIS OF THE TWIN MODE MODEL OF COUPLED FLEXION/TORSION VIBRATIONS IN TURBOFANS

R. A. J. Ford *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 297-308 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

The twin mode representation of coupled flexion/torsion vibrations in turbofans, a linear feedback system which depicts flutter as a system instability, is reviewed. An analysis which uses classical automatic control theory is presented. A stability analysis for zero phase lag on aerodynamic coupling is developed. A transfer function for the system is found, and determination of stability using Routh's criterion is explained. A more versatile characterization of flutter behavior for the twin orthogonal mode model results. Author (ESA)

N82-15058 Rolls-Royce Ltd., Derby (England). Aero Div.

AERODYNAMIC CONSIDERATIONS IN THE PREDICTION OF UNSTALLED SUPERSONIC FLUTTER IN TRANSONIC FANS

D. G. Halliwell *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 309-322 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

Two methods for the prediction of unsteady lift and moment coefficients for blades with supersonic entry flow pertaining to coupled flutter in turbofans are discussed. The first method uses a linearized supersonic model, with only weak pressure waves, while the second uses a strong normal shock model, however both are based on flat plate cascades. A basic problem in the application of the first model is discussed and a correction procedure to obtain a more rational solution is suggested. For the second model, although its shock structure is closer to the real case, overall comparison with experiment shows no improvement on the simpler model. However, results are qualitatively consistent with implied working line differences. Author (ESA)

N82-15059 Kyushu Univ., Fukuoka (Japan). Dept. of Aeronautical Engineering.

EFFECT OF MEAN BLADE LOADING ON SUPERSONIC CASCADE FLUTTER

M. Namba and R. Minami *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 323-332 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

A theory for supersonic cascade flutter with nonzero mean blade loadings was developed. An inviscid supersonic flow past a rectilinear two-dimensional cascade with subsonic leading edge locus was investigated. The theory allows for the effect of displacement of mass source and body force singular points which represent blades with nonzero thickness and mean lift force, but it neglects the effect of deviation of the local convection velocity and local speed of sound from the undisturbed uniform ones. The theory also predicts the occurrence of supersonic bending flutter at higher blade loadings. Author (ESA)

N82-15060 Technische Hochschule, Aachen (West Germany). Inst. fuer Strahlantriebe und Turboarbeitsmashinen.

A METHOD OF CHARACTERISTICS SOLUTION FOR A FINITE OSCILLATING SUPERSONIC CASCADE WITH THICKNESS EFFECTS

K. Vogeler *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 333-347 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

A method of characteristics approach to a nonlinear oscillating supersonic cascade is presented. The method is extended to a complete cascade computation for cascades with blades of nonzero thickness on the upper and lower sides. The flow field behind a single oscillating airfoil in a supersonic flow is treated and compared with an analytical flat plate solution. The technique is merged with an existing algorithm. The performance is compared with flat plate and slender blade solutions for infinite cascades. The effect of slender blades in comparison with flat plates on the unsteady aerodynamic response of an oscillating supersonic cascade are calculated for a nonlinear cascade in both the subresonant and superresonant region. Author (ESA)

N82-15061 Akademiya Nauk SSSR, Novosibirsk. Inst. of Hydrodynamics.

CALCULATION OF NONSTATIONARY FORCE RATIOS ON BLADES OF A ROTATING ROW IN INCOMPRESSIBLE FLOW

V. P. Ryabchenko *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 349-356 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

A numerical solution to a three-dimensional problem of unsteady vortex-free (in the coordinate system coupled with the cascade) flow of ideal incompressible fluid past a rotating annular cascade, based on propeller vortex and finite wing span theory, is presented. The geometry of blade edge is modeled as an annular cascade whose blades are parts of helical surfaces. Aerodynamic force calculations are given only for a large number of blades since it is essential to this method. Analysis results also show the effect of flow three-dimensionality on aerodynamic forces acting on the annular cascade blade when their number is small. Author (ESA)

N82-15062 Tokyo Univ. (Japan). Dept. of Aeronautics.

THREE-DIMENSIONAL ANALYSIS OF CASCADE FLUTTER IN PARALLEL SHEAR FLOW

S. Kaji, H. Takata, and N. Niwa *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 357-370 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

The effect of spanwise nonuniformity of stream velocity as well as that of oscillation amplitude on flutter characteristics were studied. The main stream is assumed incompressible and to be a parallel shear flow with linear velocity profile. Flutter characteristics vary in spanwise direction in accordance with the variation of flow incidence and flow velocity. The cascade model of a semiactuator disk composed of a number of flat plate blades undergoing bending oscillation is used. It is indicated that the flow shear effect becomes noticeable in connection with oscillation modes. For uniform oscillation it is weak and for linear and quadratic modes it is significant. It is found that weak shear deteriorates aerodynamic damping and extends the unstable frequency range. Author (ESA)

N82-15063 Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.

THE EFFECT OF ASPECT RATIO ON THE UNSTEADY AERODYNAMIC FORCES INDUCED BY VIBRATION OF A CASCADE BLADE

J. M. R. Graham and I. Kullar *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 371-381 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

A correction for three dimensionality made to strip theory when calculating the aerodynamic forces due to vibration of a cascade blade in incompressible flow is discussed. The three dimensional effects arise from the spanwise variation of unsteady velocity induced at the blade by the mode of vibration. Results are presented for simple cantilever type modes of vibration, using a three dimensional unsteady cascade theory for the Fourier transform of the spanwise upwash distribution. An integral equation is formulated which is solved numerically. The integral equation is also used to derive a perturbation solution for the correction terms as a series in inverse powers of the blade aspect ratio. The effect of three dimensionality on the critical reduced frequency for torsional flutter. Author (ESA)

N82-15064* Notre Dame Univ., Ind. Dept. of Aerospace and Mechanical Engineering.

THREE-DIMENSIONAL PERIODIC DISTURBANCES ACTING UPON AIRFOILS IN CASCADE

H. Atassi *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 383-398 refs (For primary document see N82-15042 06-07)

(Grant NsG-3195; Contract F49620-76-C-0014)

Avail: Issuing Activity CSCL 21E

A theory for three dimensional periodic gusts interacting with loaded airfoils was developed. The unsteady disturbances are linearized with respect to the mean potential flow of the airfoils. The vorticity transport equation is integrated analytically in a Lagrangian form. The vorticity vector shows strong variations in its magnitude and wavelength as it interacts with the flow field of a lifting airfoil. The streamwise component of vorticity increases significantly with flow acceleration and flow turning. The rectangular fan approximation is used and a single Helmholtz equation is derived that characterizes the unsteady three dimensional flow field. Author (ESA)

N82-15065 Ecole Polytechnique Federale de Lausanne (Switzerland).

PRACTICAL EXPERIENCE WITH A NONCONTACT BLADE VIBRATION MEASURING SYSTEM IN INDUSTRIAL TURBOCOMPRESSORS

R. Jenny, C. Gremli, and H. B. Guemoes *In its* Aeroelasticity in Turbomachines 1981 p 419-428 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

Blade vibration measurement with noncontact stationary probes in turbomachines is discussed. Due to the low sampling rate, the problem of nondefinite vibration reconstruction arises. This complicates vibration mode identification which is necessary for stress calculation. A method of probability analysis of the stress amplitude in connection with frequency analysis is presented. Two examples are given and blade flutter and rotating stall identification from turbocompressor measurements are shown. Author (ESA)

N82-15066 Tokyo Univ. (Japan). Inst. of Space and Aeronautical Science.

INLET DISTORTION AND BLADE VIBRATION IN COMPRESSIBLE FLOW BETWEEN PARALLEL WALLS

Y. Tanida and T. Nagashima *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 429-441 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

The two dimensional semiactuator disk model which obtains a three dimensional disturbance model with uniform mean flow between parallel walls is discussed. The inertial effects of the fluid inside the blade passages and the distortion induced vibration of rotor blades are considered. Under the assumption of small perturbations on compressible, isentropic, uniform mean flow, the equations of continuity, momentum and the isentropic flow relationship are linearized. Perturbations outside the cascade and cascade field perturbations are solved. The solutions in the usptream, cascade, and downstream flow fields are matched at the leading and trailing edges of the cascade by conservation laws of mass, momentum and total enthalpy. Bending vibration of blades is derived. Author (ESA)

N82-15067 Tennessee Univ., Tullahoma. Space Inst.

LINEAR AND NONLINEAR ANALYSIS OF VORTEX WHISTLE: ANOTHER BLADE BUSTER

M. Kurosaka *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 443-453 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

A flow induced vibration problem in gas turbines, the vortex whistles, is discussed. The whistle is caused by high swirl flow and its characteristics are such that the frequency of fluctuation is discrete (a pure tone). The frequency becomes higher as the swirl or flow rate increases. An incident of vortex whistle is cited. Besides dynamic behavior of the flow field, the data reveal an unexpected change in the steady or time averaged flow field when the whistle is present. It is implicated that dynamic flow can affect even the steady flow field in turbomachinery, which causes damage. Author (ESA)

N82-15068 Mitsubishi Heavy-Industries Ltd., Takasago (Japan). Tagasago Technical Inst.

STUDY OF ACOUSTIC RESONANCE OF CASCADES

M. Honjo and T. Tominaga *In* Ecole Polytechnique de Lausanne Aeroelasticity of Turbomachines 1981 p 455-464 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

The discrete sound generated by guide vanes was investigated experimentally. A two dimensional cascade test and a three dimensional duct guide vane model test were carried out. It is shown that the discrete noise generated by guide vanes is an

acoustic resonance effect in the flow path of the vanes. The main excitation source which induces resonance is wake vortex shedding off the trailing edges of the vanes. Bubble vortices on the concave surfaces or leading edges are not excitation sources. Author (ESA)

N82-15069# Akademiya Nauk SSSR, Novosibirsk. Inst. of Hydrodynamics.

ASPECTS OF ACOUSTIC RESONANCE PHENOMENA IN TURBOMACHINES **c08**

V. B. Kurzin *In* Ecole Polytechnique de Lauzanne Aeroelasticity of Turbomachines 1981 p 465-468 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

Natural gas oscillations around a cascade of blades and of the acoustic resonance phenomenon was analyzed. Emanation conditions allow exponential growth of natural functions at infinity. The solution is based on the adhesion method, using Green's formula for a triangular domain. Under solution periodicity along the cascade front, the discreteness of problem eigenvalues is proven and the domain of their existence is defined. A numerical analysis of the dependencies of complex eigenvalues on the Mach number of the oncoming flow, on pitch and on cascade stagger angle is made. Author (ESA)

N82-15070 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Goettingen (West Germany).

TECHNICAL EVALUATION REPORT ON THE AEROELASTICITY IN TURBOMACHINES SYMPOSIUM

H. Foersching *In* Ecole Polytechnique de Lausanne Aeroelasticity in Turbomachines 1981 p 469-477 refs (For primary document see N82-15042 06-07)

Avail: Issuing Activity

Papers presented at the symposium on aeroelasticity in turbomachines are reviewed. Emphasis is on fluid mechanics of aeroelasticity in turbomachines, motion induced fluid dynamic forces, and unsteady fluid dynamic disturbance forces along with forced blade vibrations. Also covered are classic blade flutter, stalled flow, stall flutter and other unsteady phenomena.

Author (ESA)

N82-15071# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Inst. fuer Werkstoff-Forschung.

COST 50: MATERIALS FOR GAS TURBINES Progress Report

Wolfgang Bunk and Joern Hansen 7 Jun. 1981 126 p refs Partly in GERMAN and ENGLISH

Avail: NTIS HC A07/MF A01

Welding tests with samples U 700 PM/U were performed varying the welding parameters within a wide area. Good bonding qualities could only be achieved using high welding temperatures. Contaminants and oxide inclusions in the welding zone were eliminated by using a multiple chemical cleaning procedure combined with an additional annealing of the separated specimen halfs under high vacuum conditions immediately before welding. Diffusion bonding experiments for welding IN 100 PM/IN 100 PM were carried out within a temperature range between 870 and 1100 C. Welds below 1000 C resulted in unsatisfactory bonds. Promising but not yet enough reproducible bonding strength could be obtained at welding temperatures between 1050 and 1100 C. Using special hot tensile test equipment, which is linked to an electron scanning microscope, the origin and progress of fracture processes were investigated for selected diffusion welded samples of U 700 PM. In the field of electron-beam welding some more outgassing experiments were carried out using different PM-materials of Udimet 700/Astroloy and IN 100 including wire material. Results show differences, expecially in the argon-, hydrogen- and carbon-contents. To get more exact data, similar experiments should be performed within small UHV-equipment.

Author

N82-15072# Thyssen Giesserei A.G., Bochum (West Germany). Feingusswerk.

INVESTIGATION CONCERNING THE PRODUCTION OF TURBINE BLADES AND VANES USING HIGH TEMPERATURE HIGH STRENGTH IN-SITU COMPOSITES Final Report, Jul. 1980

Adolf Donner Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 90 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-039; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18,90

Techniques of directional solidification for air cooled turbine blades and vanes made of eutectic alloys were evaluated based on results for rod-like specimens. Directionally solidified eutectic alloys (in situ composites) show superior creep properties in comparison with common superalloys used both in aeronautical and industrial gas turbines. An adequate facility for the process of directional solidification (D S) was designed and built; suitable D S parameters, ceramic shell molds and ceramic cores were developed. The results of the experiments prove the possibility of production of air cooled aeronautical engine blades and vanes by application of the D S process on eutectic alloys of type C 73, using ceramic cores. The D S process is also satisfactory as to the production of large blades for industrial gas turbines. Regarding the macrostructure of large internally cooled vanes, the process still needs improvement. Author (ESA)

N82-15073# Motoren- und Turbinen-Union Muenchen G.m.b.H. (West Germany).

ADVANCED COMPRESSOR COMPONENTS. PHASE 1: 1978 TO 1979 Final Report, May 1980

Wolfgang Weiler, Franz Strasser, Eberhard Knodel, and Herbert Merz Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 250 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-W-81-025; ISSN-0170-1339) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 42,50

An advanced 800 kW aero engine type compressor was developed. The design is of the axial centrifugal type where the cascades of the axial part have supercritical profiles. Detailed layouts are shown and the aerodynamic design and optimization techniques for the cascades are given. The application of fiber reinforced materials is actively investigated for both the compressor housing and its rotor and a detailed catalog of the various functions of and solicitations for such materials is appended.

Author (ESA)

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N82-15074*# Calspan Advanced Technology Center, Buffalo, N.Y.

IN-FLIGHT INVESTIGATION OF THE EFFECTS OF PILOT LOCATION AND CONTROL SYSTEM DESIGN ON AIRPLANE FLYING QUALITIES FOR APPROACH AND LANDING Final Report

Norman C. Weingarten and Charles R. Chalk Jan. 1982 215 p refs Sponsored jointly by Dryden Flight Research Facility and USAF Flight Dynamis Labs.

(Contract F33615-79-C-3618)

(NASA-CR-163115; CALSPAN-6645-F-7) Avail: NTIS HC A10/MF A01 CSCL 01C

The handling qualities of large airplanes in the approach and landing flight phase were studied. The primary variables were relative pilot position with respect to center of rotation, command path time delays and phase shifts, augmentation schemes and levels of augmentation. It is indicated that the approach and landing task with large airplanes is a low bandwidth task. Low equivalent short period frequencies and relatively long time delays are tolerated only when the pilot is located at considerable distance forward of the center of rotation. The control problem experienced by the pilots, when seated behind the center of rotation, tended to occur at low altitude when they were using visual cues of rate of sink and altitude. A direct lift controller

improved final flight path control of the shuttle like configurations. E.A.K.

N82-15075*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LONGITUDINAL AND LATERAL STATIC STABILITY AND CONTROL CHARACTERISTICS OF A 1/6-SCALE MODEL OF A REMOTELY PILOTED RESEARCH VEHICLE WITH A SUPERCRITICAL WING
Thomas A. Byrdsong and James B. Hallissy May 1979 118 p refs
(NASA-TP-1360; L-12059) Avail: NTIS HC A06/MF A01 CSCL 01C

An investigation was conducted in the Langley 8-foot transonic pressure tunnel to determine the longitudinal and lateral-directional static stability and control characteristics of a 1/6-scale force model of a remotely piloted research vehicle. The model was equipped with a supercritical wing and employed elevons for pitch and roll control. Test conditions were as follows: Reynolds number of about 6.6 x 10 to the 6th power per meter, variations of sideslip from -6 deg to 6 deg, elevon deflection angle (symmetrically and asymmetrically) from -9 deg to 3 deg, and rudder deflection angle from 0 deg to -10 deg. The model was longitudinally statically stable at angles of attack up to about 7 deg, which is significantly greater than the angle of attack for the cruise condition (approximately 4 deg). In the range of test Mach numbers, the model was directionally stable and had positive effective dihedral, sufficient pitch control, and positive effectiveness of roll and yaw control. Author

N82-15076*# Lockheed-California Co., Burbank.
ACCELERATED DEVELOPMENT AND FLIGHT EVALUATION OF ACTIVE CONTROLS CONCEPTS FOR SUBSONIC TRANSPORT AIRCRAFT. VOLUME 1: LOAD ALLEVIATION/EXTENDED SPAN DEVELOPMENT AND FLIGHT TESTS Final Report
J. F. Johnston Sep. 1979 261 p refs
(Contract NAS1-14690)
(NASA-CR-159097; LR-29003-1-Vol-1) Avail: NTIS HC A12/MF A01 CSCL 01C

Active wing load alleviation to extend the wing span by 5.8 percent, giving a 3 percent reduction in cruise drag is covered. The active wing load alleviation used symmetric motions of the outboard ailerons for maneuver load control (MLC) and elastic mode suppression (EMS), and stabilizer motions for gust load alleviation (GLA). Slow maneuvers verified the MLC, and open and closed-loop flight frequency response tests verified the aircraft dynamic response to symmetric aileron and stabilizer drives as well as the active system performance. Flight tests in turbulence verified the effectiveness of the active controls in reducing gust-induced wing loads. It is concluded that active wing load alleviation/extended span is proven in the L-1011 and is ready for application to airline service; it is a very practical way to obtain the increased efficiency of a higher aspect ratio wing with minimum structural impact. T.M.

N82-15077*# Lockheed-California Co., Burbank.
ACCELERATED DEVELOPMENT AND FLIGHT EVALUATION OF ACTIVE CONTROLS CONCEPTS FOR SUBSONIC TRANSPORT AIRCRAFT. VOLUME 2: AFT C.G. SIMULATION AND ANALYSIS Final Report
D. M. Urie Hampton, Va. NASA Sep. 1979 89 p
(Contract NAS1-14690)
(NASA-CR-159098; LR-29003-Vol-2) Avail: NTIS HC A05/MF A01 CSCL 01C

Relaxed static stability and stability augmentation with active controls were investigated for subsonic transport aircraft. Analytical and simulator evaluations were done using a contemporary wide body transport as a baseline. Criteria for augmentation system performance and unaugmented flying qualities were evaluated. Augmentation control laws were defined based on selected frequency response and time history criteria. Flying qualities evaluations were conducted by pilots using a moving base simulator with a transport cab. Static margin and air turbulence intensity were varied in test with and without augmentation. Suitability of a simple pitch control law was verified at neutral static margin in cruise and landing flight tasks. Neutral stability was found to be marginally acceptable in heavy turbulence in both cruise and landing conditions. Author

N82-15078# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abt. Flugzeugsteuerung und -regelung.
AN OBSERVER APPROACH TO THE IDENTIFICATION AND ISOLATION OF SENSOR FAILURES IN FLIGHT CONTROL SYSTEMS Ph.D. Thesis - Tech. Univ., Carolo-Wilhelmina, West Germany
Norbert Stuckenberg Jul. 1981 140 p refs Report will also be announced as translation (ESA-TT-738)
(DFVLR-FB-81-26; ESA-TT-738) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 32

A reliability concept for flight control sensors is presented providing a duplex sensor configuration with fail-operational capabilities by using analytical redundancy with deterministic observers. Without disregarding disturbances and plant parameter variations the identification performance is evaluated with respect to the failure signal properties. The concept is applied to a command and stability augmentation system for the lateral motion of the executive aircraft HFB 320. Author

N82-15069# Akademiya Nauk SSSR, Novosibirsk. Inst. of Hydrodynamics.
ASPECTS OF ACOUSTIC RESONANCE PHENOMENA IN TURBOMACHINES
V. B. Kurzin *In* Ecole Polytechnique de Lauzanne Aeroelasticity of Turbomachines 1981 p 465-468 refs (For primary document see N82-15042 06-07)
Avail: Issuing Activity

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

N82-15079*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
NASA DRYDEN FLIGHT LOADS RESEARCH FACILITY
Walter J. Sefic Dec. 1981 43 p refs
(NASA-TM-81368) Avail: NTIS HC A03/MF A01 CSCL 14B

The Dryden Flight Loads Research Facility (NASA) and the associated equipment for simulating the loading and heating of aircraft or their components are described. Particular emphasis is placed on various fail-safe devices which are built into the equipment to minimize the possibility of damage to flight vehicles. The equipment described includes the ground vibration and moment of inertia equipment, the data acquisition system, and the instrumentation available in the facility for measuring load, position, strain, temperature, and acceleration. R.J.F.

N82-15080# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
THE LINK-MILES DRIVER TRAINING SIMULATOR FOR TRACKED VEHICLES: A VALIDATION STUDY
J. Moraal and K. J. Poll 1979 29 p refs In DUTCH; ENGLISH summary
(Contract A76/KL/148)
(IZF-1979-23; TDCK-73404) Avail: NTIS HC A03/MF A01

The validity of the Link-Miles driver training simulator was investigated for tracked vehicles in use with the Dutch Army. Transfer of training, behavioral validity and required training time could be assessed for four different driving tasks, based on the performance of experienced as well as inexperienced subjects. It is concluded that the simulator is to be regarded as a valuable training aid, provided that: (1) a number of technical imperfections are corrected; (2) the users' know-how with regard to possibilities and limitations of the simulator is increased; and (3) the demands made on the instructors and the contents of the instruction

program are reconsidered, as well as the way the simulator is used in the context of the complete military training program.
Author

N82-15081# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
OPTICAL PROPERTIES OF AIRFIELD LIGHTING FIXTURES OF THE ROYAL NETHERLANDS AIRFORCE. PART 1: COLOR MEASUREMENTS
P. Padmos and R. vanLeeuwen 1980 20 p In DUTCH; ENGLISH summary 2 Vol.
(Contract A78/KLu/085)
(IZF-1980-1-Vol-1; TDCK-73414) Avail: NTIS HC A02/MF A01

Airfield lighting fixtures in use in the Royal Netherlands' Airforce were sampled and used to measure to what extent the chromaticity coordinates are corresponding to the NATO-Standardization Agreements. For the yellow and red filters, especially, it is important to measure the chromaticity of the mounted lamp-filter combinations, because heating may cause a considerable shift in chromaticity. For each fixture the measurements were performed at nominal maximum luminous intensity. Moreover, for a number of representative colors, measurements were made at the reduced intensity settings normally in use. Conclusions regarding, rejecting, or accepting are tabulated.
Author

N82-15082# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
OPTICAL PROPERTIES OF AIRFIELD LIGHTING FIXTURES OF THE ROYAL NETHERLANDS AIRFORCE. PART 2: INTENSITY MEASUREMENTS
P. Padmos and R. vanLeeuwen 1980 38 p In DUTCH; ENGLISH summary 2 Vol.
(Contract A78/KLu/085)
(IZF-1980-12-Vol-2; TDCK-75011) Avail: NTIS HC A03/MF A01

Most lighting fixtures did not fulfill NATO-Standardization requirements in one or another way. The most conspicuous error was found in a taxiway fixture, where the beam maximum appeared to be directed downwards. Many red filters have a deep red color, which lessens the light output. In most cases a considerable improvement in light output can be obtained by applying a more orange-red-color, for which the color requirements give room. It appears that for some red glass filters the transmission is lowered considerably by heating. Author

N82-15083# Messerschmitt-Boelkow-Blohm G.m.b.H., Munich (West Germany). Experimental Aerodynamics.
DEVELOPMENT AND TRIAL OF A ROTARY BALANCE FOR THE 3 m-LOW SPEED WIND TUNNELS IN THE FEDERAL REPUBLIC OF GERMANY Final Report, Dec. 1979
Bernd Schulze Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 70 p refs In GERMAN, ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-022; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14,70

A rotary balance was developed for determining aerodynamic damping due to rolling by means of a stationary measuring procedure. Due to the uniform rotation around the wind tunnel axis, vortex relaxation effects that might result from oscillatory balances are avoided. Layout, instrumentation, and data processing are described. Results obtained by using the apparatus during different wind tunnel tests with a calibration model correlate well with existing reference data and flight test data. Dynamic stability derivates due to rolling can be measured for angles of attack up to 90 deg and for extreme angles of inclination.
Author (ESA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N82-15084*# General Electric Co., Philadelphia, Pa. Space Systems Div.
FEASIBILITY STUDY: ATMOSPHERIC GENERAL CIRCULATION EXPERIMENT, VOLUME 1 Final Report
R. J. Homsey, ed. 1 Sep. 1981 97 p refs 2 Vol.
(Contract NAS8-34049)
(NASA-CR-161889-Vol-1) Avail: NTIS HC A05/MF A01 CSCL 22A

The atmospheric general circulation experiment (AGCE) uses a rotating fluid flow cell assembly. The key technical areas affecting the feasibility of the design and operation of the AGCE are investigated. The areas investigated include materials for the flow cell assembly, thermal design, high voltage power supply design, effective retrieval and handling of experiment data and apparatus configuration. Several materials, DMSO and m-tolunitrile, were selected as candidate fluids for the flow cell principally for their high dielectric constant which permits the high voltage power supply design to be held to 15 kV and still simulate terrestrial gravity. Achievement of a low dissipation factor in the fluid to minimize internal heating from the applied electrical field depends strongly on purification and handling procedures. The use of sapphire as the outer hemisphere for the flow cell provides excellent viewing conditions without a significant impact on attaining the desired thermal gradients. Birefringent effects from sapphire can be held to acceptably low limits. Visualization of flow fluid is achieved through the motion of a dot matrix formed by photochromic dyes. Two dyes found compatible with the candidate fluids are spiropyran and triarylmethane. The observation of the dot motion is accomplished using a flying spot scanner. S.L.

N82-15085*# General Electric Co., Philadelphia, Pa. Space Systems Div.
FEASIBILITY STUDY: ATMOSPHERIC GENERAL CIRCULATION EXPERIMENT, VOLUME 2 Final Report
R. J. Homsey, ed. 1 Sep. 1981 604 p refs 2 Vol.
(Contract NAS8-34049)
(NASA-CR-161889-Vol-2) Avail: NTIS HC A99/MF A01 CSCL 20D

The feasibility analysis of the atmospheric general circulation experiment (AGCE) are documented. The analysis performed in each technical area, the rationale and substantiation for the design approaches selected for the hardware, and the design details for the baseline AGCE are presented. S.L.

N82-15086# Technische Univ., Berlin (West Germany). Anorganische Werkstoffe.
EXPERIMENTS FOR THE PREPARATION OF PURE NONMETALLIC INORGANIC MATERIALS UNDER SPACE CONDITIONS Final Report, Dec. 1979
Gerhard Brekow Bonn Bundesministerium fuer Forschung und Technologie Apr. 1981 150 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-014; ISSN-0170-1339) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 31,50

The diffusion kinetics of the oxidation and nitridation of silica and the oxidation of aluminum were investigated below and above the melting point of the two metals under high-purity conditions. The electromagnetic levitation technique was used for the containerless positioning of the metal melts in a gas stream. Using gravimetric data, the growth constants, the diffusion coefficients and activation energies were calculated. With the experimental conditions presented here, Al2O3 and SiO2 samples can be prepared at time intervals which can be expected to be available during the future Spacelab missions. The levitation technique could not be used for the nitridation of Si-melts at temperatures higher than 1540 C because of instabilities in positioning and increased decomposition rates. T.M.

N82-15087# Maschinenfabrik Augsburg-Nuernberg A.G., Munich (West Germany). Bereich Neue Technologie.
APPLICATION OF SKIN TECHNOLOGY: TEXUS 2 EXPERIMENT Final Report, Dec. 1979
Heinz Sprenger and Klaus Schweitzer (Motoren- und Turbinen-Union Muenchen GmbH) Bonn Bundesministerium fuer

Forschung und Technologie Aug. 1981 63 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-028; ISSN-0170-1339) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13,25

To avoid the deformation caused by the volume expansion of the sample during melting observed in TEXUS 1, the samples were provided with a small hole in order to compensate for this effect. The possibility of transforming a powder metallurgically prepared sample into a case uniform structure was investigated. The sample consisted of a yttria-dispersed IN 738 superalloy. Though the heating chamber failed in the TEXUS 2 flight before reaching the final temperature, the samples were melted up to half their volume. The shape retaining effect of the skin was however not very pronounced because one of the samples had been free flying within the cartridge and had been in contact with the TZM material, while the second sample became inflated due to gas left in the micropores after the powder-metallurgical processing. Author

N82-15088# Bundesanstalt fuer Materialpruefung, Berlin (West Germany).
PREPARATION, IMPLEMENTATION AND EVALUATION OF MATERIAL SCIENCE EXPERIMENTS UNDER THE SLN PROGRAM TEXUS 2 Final Report, Jan. 1980
Hartmut Schlecker and Peter Szimkowiak Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 44 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie Prepared in cooperation with Technische Hochschule, Vienna
(BMFT-FB-W-81-033; ISSN-0170-1339) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,25

In order to evaluate the effects of microgravity on vacuum brazing and the phenomena involved (i.e., flow of braze metal, joint filling, microstructure), an experiment was performed in the isothermal heating furnace of the TEXUS II sounding rocket. The specimen, consisting of four Ni-cylinders inserted one inside the other to form a 200 um cylindrical gap and a 0-2000 um sickle-shaped gap, was brazed with a near eutectic Ag-Cu alloy. This brazing alloy contained a small amount of Li to promote spreading (58 Ag: 39 Cu: 3 Li at. pct), and radioactive 110 m Ag as tracer metal. The specimen was evaluated by X-ray radiography, autoradiography and metallographic techniques. This experiment was carried out in preparation of the FSLP-experiment ES 304/ES 305. Author

N82-15089# Battelle Inst., Frankfurt am Main (West Germany).
INTERNAL CONVECTION UNDER LOW GRAVITY DUE TO ORTHOGONAL GRADIENTS OF TEMPERATURE AND CONCENTRATION Final Report, Dec. 1980
Bernd Fuessel, Wolfgang Kottler, and Dieter Langbein Bonn Bundesministerium fuer Forschung und Technologie Oct. 1981 106 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-041; ISSN-0170-1339) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22,30

The existence of an interface energy between miscible fluids was demonstrated with the system methanol-cyclohexane. When carefully overlaying methanol saturated with cyclohexane on pure methanol, the saturated methanol forms distinct droplets, which migrate aside and dissolve within a few seconds. After about twenty minutes a curved interface develops between the pure methanol at the bottom and the overlayed methanol, which then contains only about four mol percent cyclohexane. Internal convection in the presence of non-parallel gradients of temperature and concentration is made evident by detailed investigations into the intermolecular attraction. The basic equations of this attraction were derived. Internal convection arises whenever it reduces the medium distance of molecules of the same species, i.e., if regions of equal concentration approach each other. T.M.

N82-15090# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
INVESTIGATIONS OF MICROMETEORITE IMPACTS ON LARGE SURFACES AND DURING LONG-TERM MISSIONS [UNTERSUCHUNGEN VON MIKROMETEORITEN-EINSCHLAEGEN IN GROSSEN FLAECHEN UND BEI LANGZEITMISSIONEN]
E. Igenbergs and H. Fechtig (Max-Planck Inst. fuer Kernphysik) Oct. 1980 73 p refs In GERMAN Sponsored by Bundesministerium fuer Forschung und Technology
(TUM-RT-TB-80/12) Avail: NTIS HC A04/MF A01

The number of dust particle impacts expected during space missions was investigated and a long-term experiment is presented in order to study the suitability of Spacelab as a micrometeorite detector. A detailed inventory was made of available information on the dust environment. The dust particle expectancy values are given for several planetary and interplanetary missions mentioned in the Lunar and Planetary Mission Handbook. The heat shield surface of Spacelab modules is not suited for micrometeorite detection due to the relatively short flight time. An experiment is proposed for the second mission of the Long Duration Exposure Facility. This experiment is to obtain information on the dust environment close to the Earth and is to contribute to the development of interplanetary dust measuring devices. Author (ESA)

N82-15091# Technische Univ., Berlin (West Germany). Inst. fuer Nichtmetallische Werkstoffe.
INVESTIGATION ON THE APPLICABILITY OF SLIP CASTING FOR THE PRODUCTION OF CERMETS UNDER MICROGRAVITY CONDITIONS Final Report, Jul. 1978
Gisela Seufert Bonn Bundesministerium fuer Forschung und Technologie Apr. 1981 77 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium Forschung und Technologie
(BMFT-FB-W-81-017; ISSN-0170-1339) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16,20

The feasibility of slip casting for the production of cermets, with homogeneous distribution of metal particles in the ceramic matrix to establish whether phase separation by sedimentation is so critical that it necessitates space processing was studied. Procedures were developed for the casting of compositions of 95% oxide and 5% metal powder of grain. It is shown that sedimentation of the metal particles does not occur below some density and viscosity threshold of the slip and that the solvent concentration plays a lesser role. Conditions are found where an homogeneous distribution is obtained, as borne out by X-ray and electron microscope testing. Author (ESA)

N82-15092# Freiburg Univ. (West Germany). Kristallographisches Inst.
PREPARATION OF SPACELAB EXPERIMENTS ON Si, CdTe, AND ZnS CRYSTAL GROWTH DURING THE E1 AND D1 MISSIONS AND CONSTRUCTION AND TESTING OF A SINGLE ELLIPSOID MIRROR HEATING FACILITY Final Report, May 1980
Achim Eyer, Harald Leiste, Magarete Schumacher, and Herbert Walcher Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 189 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-023; ISSN-0170-1339) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 35,40

Spacelab experiments on the growth of Si, CdTe, and ZnS crystals were prepared by improving growth techniques, by adapting existing furnaces, and by the development of heating facilities. Dislocation-free silicon single crystals were grown by the floating-zone technique. Space experiments are indicated to be extremely useful in determining which type of convection in the melt is responsible for the striations observed in all crystals. Purification of Cd and Te, synthesis of high purity CdTe, and C coated growth ampules were improved. Growth by sublimation is shown to yield numerous twinned single crystals. High purity ZnS could be synthesized and single crystals were grown in a resistance furnace in quartz ampules with well defined gaseous zones. Single ellipsoid mirror furnaces were constructed which are particularly suited for growth experiments in ampules. Their thermal properties were studied and compared with those of the existing double ellipsoid furnace. The latter was further

improved and supplemented by a control system regulating the integral radiation of the furnace. Author (ESA)

N82-15093# Hochschule der Bundeswehr, Hamburg (West Germany). Lab. fuer Werkstoffkunde und Schweisstechnik.
INVESTIGATIONS ON THE INFLUENCE OF GRAVITY ON JOINING PROCESSES WITH LIQUID MELTS, AND OF BRAZING AND WELDING EXPERIMENTS UNDER WEIGHTLESSNESS Final Report, Jul. 1980
Hans Hoffmeister and Juergen Ruediger Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 94 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-024; ISSN-0170-1339) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19.75

Physical mechanisms in welding and brazing likely to be affected by space conditions are considered and the literature on actual space experiments is reviewed. Proposed Spacelab test experiments and complementary testing on Earth are described. Further development needs are identified in arc welding. It is proposed to analyze the influence of gravity on material transfer, on the shape and structure of seam, and on the segregation of the phases by: (1) taking advantage of rotary motions on Earth in order to raise the g level or to create short time weightlessness; (2) working in an aircraft or rocket under longer microgravity conditions; and (3) performing arc-spot welding in a vacuum so as to develop this process for use in space. Author (ESA)

N82-15094# Max-Planck-Institut fuer Metallforschung, Stuttgart (West Germany). Pulvermetallurgisches Lab.
THE ROLE OF THE WETTABILITY FOR THE PRODUCTION OF COMPOSITE MATERIALS IN SPACE: QUANTITIES, INFLUENCES AND MODELS Final Report, Mar. 1980
Josef Haag Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 283 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Bundesministerium
(BMFT-FB-W-81-021; ISSN-0170-1339) Avail: NTIS HC A13/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 44.80

Unsatisfactory first results of remelting pressed powder mixtures in American and German space experiments form the basis for a discussion of the role of wettability in processing particle composites in space. Considering the meaning of Young's wetting angle for the description of wetting behavior, the character of a non-equilibrium wetting angle as a geometric value is clearly established. A geometric dependence of the kinetics also results from the wetting kinetics, which is usually described using the energetic driving force, namely the wetting tension. As a consequence, the geometry changes during the remelting and wetting process have to be considered. Regarding special materials combinations, it was attempted to give access to surface to thermodynamic properties from both experimental and theoretical ways of getting the data and estimating possible external influences. Author

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

No abstracts in this category.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

N82-15095*# Computer Technology Associates, Arlington, Va.
OFFICE OF SPACE TERRESTRIAL APPLICATIONS (OSTA)/ APPLICATIONS DATA SERVICE (ADS) DATA SYSTEMS STANDARDS
Barbara A. Walton, ed. Washington Dec. 1981 270 p refs Proceedings of Workshop held at Greenbelt, Md., 27-29 May 1981
(NASA-CP-2196) Avail: NTIS HC A12/MF A01 CSCL 14B

Standards needed to interconnect applications data service pilots for data sharing were identified. Current pilot methodologies are assessed. Recommendations for future work are made. A preliminary set of requirements for guidelines and standards for catalogues, directories, and dictionaries was identified. The user was considered to be a scientist at a terminal. Existing and emerging national and international telecommunication standards were adopted where possible in view of new and unproven standards. For individual titles, see N82-15096 through N82-15104.

N82-15096*# Computer Technology Associates, Arlington, Va.
OSTA DATA SYSTEMS PLANNING WORKSHOP RECOMMENDATIONS
Richard DesJardins *In* NASA. Goddard Space Flight Center Office of Space and Terrest. Appl. (OSTA)/Appl. Data Serv. (ADS) Data Systems Std. Dec. 1981 p 5-10 (For primary document see N82-15095 06-14)
Avail: NTIS HC A12/MF A01 CSCL 14B

The Integrated Discipline Requirements are presented, including the following needs: (1) quality data sets, (2) a systematic treatment of problems with present data, (3) a single integrated catalog or master directory, (4) continuity of data formats, (5) a standard geographic and time basis, (6) data delivery in terms of easy rather than immediate accessibility, (7) data archives, and (8) cooperation with user agencies. N.W.

N82-15097*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE ROLE OF PILOTS
J. Patrick Gary *In its* Office of Space and Terrest. Appl. (OSTA)/Appl. Data Serv. (ADS) Data Systems Std. Dec. 1981 p 11-18 (For primary document see N82-15095 06-14)
Avail: NTIS HC A12/MF A01 CSCL 14B

The need for detailed specifications is addressed. Candidates for standardization include hardware interfaces, communication protocols, and data exchange services. Atmosphere, Ocean, and Resource pilot programs, utilization of current techniques and technologies in the use and exchange of data and to facilitate access to data are discussed. Pilot objectives aim to: (1) demonstrate the use of advanced technologies, (2) provide a test bed environment for data handling technique evaluation, (3) evolve requirements and capabilities, and (4) document validated methodologies as standards and guidelines for data systems planning use. A user oriented catalog system, data set management, a network communication system, and a user interface are also discussed. N.W.

N82-15098*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OSTA/ADS STANDARDS DEVELOPMENT PROCESS
Barbara Walton *In its* Office of Space and Terrest. Appl. (OSTA)/App. Data Serv. (ADS) Data Systems Std. Dec. 1981 p 19-26 (For primary document see N82-15095 06-14)
Avail: NTIS HC A12/MF A01 CSCL 14B

A phased approach to data systems standards was developed. The standards survey, user requirements, methodology survey, and evaluation criteria were completed. Remaining to be done are data system planning interim standards, a concept for implementation of a core applications data service, a data

systems policy definition, and full capability data services definition. N.W.

N82-15099*# Mitre Corp., McLean, Va.
OVERVIEW OF THE CURRENT MITRE EFFORT
Terry Kuch and Rick Sakamoto *In* NASA. Goddard Space Flight Center Office of Space and Terrest. Appl. (OSTA)/Appl. Data Serv. (ADS) Data Systems Std. Dec. 1981 p 27-31 (For primary document see N82-15095 06-14)
Avail: NTIS HC A12/MF A01 CSCL 14B

A logical view of the applications data service (ADS) as a distributed system was adopted. A hierarchical classification scheme of ADS features comprising 70 modes was developed. The framework for a preliminary assessment of the applicability Federal, national, and international standards to ADS was provided by the classification. Approximately 300 standards were gathered, screened, and documented. The survey was enlarged to incorporate standards from NASA headquarters and centers. Two efforts were initiated to (1) survey methodologies of the three ADS pilots, and (2) identify the requirements for standards of ADS members based on a survey of the pilots and on representative future members. Preliminary results of the requirements survey were used in the development of criteria for the evaluation of candidate standards. An evaluation process was designed incorporating these criteria. N.W.

N82-15100*# Mitre Corp., McLean, Va.
ADS PILOT METHODOLOGIES AS CANDIDATES FOR ADS STANDARDS
Paul Giragosian *In* NASA. Goddard Space Flight Center Office of Space and Terrest. Appl. (OSTA)/Appl. Data Serv. (ADS) Data Systems Std. Dec. 1981 p 32-37 (For primary document see N82-15095 06-14)
Avail: NTIS HC A12/MF A01 CSCL 14B

Panel presentations and activities aimed at a critical assessment of the completeness and accuracy of a pilot methodology survey for an Applications Data Service are presented. Standards for interconnecting pilot programs for data sharing are outlined. Panel responsibilities and assignments for the session are given. M.D.K.

N82-15101*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PANEL A REPORT: STANDARDS NEEDED TO INTERCONNECT ADS PILOTS FOR DATA SHARING FOR CATALOGUES, DIRECTORIES, AND DICTIONARIES
In its Office of Space and Terrest. Appl. (OSTA)/Appl. Data Serv. (ADS) Data Systems Std. Dec. 1981 p 36-44 refs (For primary document see N82-15095 06-14)
Avail: NTIS HC A12/MF A01 CSCL 14B

User requirements, guidelines, and standards for interconnecting an Applications Data Service (ADS) program for data sharing are discussed. Methods for effective sharing of information (catalogues, directories, and dictionaries) among member installations are addressed. An ADS Directory/Catalog architectural model is also given. M.D.K.

N82-15102*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PANEL B REPORT: STANDARDS NEEDED TO INTERCONNECT ADS PILOTS FOR DATA SHARING FOR USER INTERFACES
In its Office of Space and Terrest. Appl. (OSTA)/Appl. Data Serv. (ADS) Data Systems Std. Dec. 1981 p 45-52 (For primary document see N82-15095 06-14)
Avail: NTIS HC A12/MF A01 CSCL 14B

Requirements for standards and guidelines related to user interfaces for interconnecting an Applications Data Service pilot program are discussed. Key elements considered were: (1) dial up procedures, (2) terminals (minimum, desirable, extended capability), (3) common capabilities, (4) language interfaces (query, command, menu), and (5) display capabilities. M.D.K.

N82-15103*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PANEL C REPORT: STANDARDS NEEDED FOR THE USE OF ISO OPEN SYSTEMS INTERCONNECTION - BASIC REFERENCE MODEL
In its Office of Space and Terrest. Appl. (OSTA)/Appl. Data Serv. (ADS) Data Systems Std. Dec. 1981 p 55-66 (For primary document see N82-15095 06-14)
Avail: NTIS HC A12/MF A01 CSCL 14B

The use of an International Standards Organization (ISO) Open Systems Interconnection (OSI) Reference Model and its relevance to interconnecting an Applications Data Service (ADS) pilot program for data sharing is discussed. A top level mapping between the conjectured ADS requirements and identified layers within the OSI Reference Model was performed. It was concluded that the OSI model represents an orderly architecture for the ADS networking planning and that the protocols being developed by the National Bureau of Standards offer the best available implementation approach. M.D.K.

N82-15104*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
PANEL D REPORT: STANDARDS NEEDED TO INTERCONNECT ADS PILOTS FOR DATA SHARING IN DATA FORMATS AND DESCRIPTIONS
In its Office of Space and Terrest. Appl. (OSTA)/Appl. Data Serv. (ADS) Data Systems Std. Dec. 1981 p 67-70 (For primary document see N82-15095 06-14)
Avail: NTIS HC A12/MF A01 CSCL 14B

Data exchange specifications and standards needed to facilitate the interchange of information between three pilot modes in an Applications Data Service program are addressed. In designing standards, the following considerations were considered important: (1) accessible, understandable Data Base Management Systems (DBMS) catalogs, (2) formatting conventions, (3) archival data records and data descriptions formats, (4) standardized terminology, and (5) optimization of data formats by individual DBMS. M.D.K.

N82-15105# Prins Maurits Lab. TNO, Rijswijk (Netherlands). Inst. voor Chemische en Technologische Research.
STRUCTURAL SAFETY ANALYSIS OF PROPOSED HARPOON TEST FACILITY [VEILIGHEIDSANALYSE HARPOON TESTCELLEN]
J. Schippers Nov. 1979 32 p refs In DUTCH; ENGLISH summary
(Contract A77/KM/149)
(PML-1979-74; TDCK-73394) Avail: NTIS HC A03/MF A01

An analysis was performed on the basis of existing plans to build two missile test cells. The first solution is a cell with reinforced concrete walls and one wall functioning as a venting surface and the second a cell with walls consisting of multiple layers through which the effect of the explosion is contained in the cell structure. Disadvantages of the first solution are the fairly large structural deformations of the walls, the occurrence of spalling and the loading of the neighoring buildings by the shock wave emerging from the cell. The advantage of this method is that it is a conventional solution whose dangerous aspects are known. The advantage of the second solution is the fact that the entire explosion is confined in a special cell structure. The effect on the environment will be negligible. Disadvantage of this solution is that it is a new, unknown and untested technique. T.M.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N82-15106*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
SYSTEM ANALYSIS APPROACH TO DERIVING DESIGN CRITERIA (LOADS) FOR SPACE SHUTTLE AND ITS PAYLOADS. VOLUME 2: TYPICAL EXAMPLES
Robert S. Ryan, Tulon Bullock, Wayne B. Holland, Dennis A. Kross, and Larry A. Kiefling Dec. 1981 128 p refs
(NASA-TP-1950; M-359-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 22B

The achievement of an optimized design from the system

standpoint under the low cost, high risk constraints of the present day environment was analyzed. Space Shuttle illustrates the requirement for an analysis approach that considers all major disciplines (coupling between structures control, propulsion, thermal, aeroelastic, and performance), simultaneously. The Space Shuttle and certain payloads, Space Telescope and Spacelab, are examined. The requirements for system analysis approaches and criteria, including dynamic modeling requirements, test requirements, control requirements, and the resulting design verification approaches are illustrated. A survey of the problem, potential approaches available as solutions, implications for future systems, and projected technology development areas are addressed. E.A.K.

N82-15107*# National Aeronautics and Space Administration, Washington, D. C.

MISSION OPERATION REPORT: RCA-C1/DELTA LAUNCH

[1982] 26 p

(NASA-TM-84087; Rept-0-492-206-82-05) Avail: NTIS HC A03/MF A01 CSCL 22B

The prelaunch mission operation report for the launch of RCA Satcom C(1) on a Delta 3910 launch vehicle is presented. The spacecraft and launch vehicle are described. S.L.

N82-15108# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).

ROBISAT: CONCEPT AND FEASIBILITY STUDY, PHASE A Final Report

Eberhard Achtermann, Karl-Ludwig Bitzer, Ludwig Borucki, Klaus Ernsberger, Paul Gillett, Manfred Granzow, Wolfgang Kriegl, Guenter Lehn, Gerhard Lippner, Rolf Ockert et al Bonn Bundesministerium fuer Forschung und Technologie Dec. 1980 35 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-W-80-033; ISSN-0170-1339) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 7,20

The results of a feasibility study on an X-ray satellite (ROBISAT) are summarized. Within the framework of this study alternative systems concepts were analyzed, and a preferred satellite concept has evolved for a telescope with 80 cm aperture. It is shown that the required sky survey can easily be accomplished by means of a spinning satellite in a Sun-synchronous dawn-dusk orbit. J.M.S.

N82-15109# Max-Planck-Institut fuer Kernphysik, Heidelberg (West Germany).

AERONOMY SATELLITES AEROS A AND B: THE ASSISTANCE TO THE PROJECT BY THE PROJECT SCIENTIST *Final Report, Apr. 1981*

Peter Laemmerzahl Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 43 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-W-81-029; ISSN-0170-1339) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,05

With the German-U.S. research satellite AEROS-A and the German satellite AEROS-B the most important aeronomic parameters in the upper atmosphere were measured between December 1972 and September 1975. Simultaneous observations of densities, composition, and temperatures of both the atmospheric neutral gas and the ionospheric plasma and, in addition, of the solar energy influx in the extreme ultraviolet was essential to allow for an integrated analysis of the aeronomic interactive processes. The responsibility within the project management for all scientific matters was with the project scientist, and this report is on his contribution to meet the goal of the mission. Also the experimental and mission aspects, the management organization, the project development, and the major science return from the AEROS program are explained. Author

N82-15110# Air Force Systems Command, Wright-Patterson AFB, Ohio.

METEOROLOGICAL SATELLITES

16 Oct. 1981 7 p refs Transl. into ENGLISH from Skrzydlata Polska (Poland) no. 27, 1979 21 p

(AD-A107427; FTD-ID(RS)T-1059-81) Avail: NTIS HC A02/MF A01 CSCL 22B

Meteor-2 (second generation meteorological satellite) and an experimental satellite on which instruments are being tested and modified for the requirements of hydrometeorology and a determination of natural resources are presently operational in the U.S.S.R. Television devices with a 1-10 km terrain image resolution operating in the visible and infrared region are used to determine the space system, velocity and direction of cloud movements and provide information about the snow and ice cover, cyclones, storms, vortices in the atmosphere, and velocity and direction of wind. Images with a 50-1000 m resolution make possible geological and hydrological surveys, an evaluation of the state of vegetation and crops, detection of forest fires, determination of pollution of the atmosphere and sea and determination of optimal fishing regions in the ocean. Measurement of the intensity of atmospheric radiation in narrow infrared regions and very high frequencies allows remote evaluation of the temperature and humidity distribution in the vertical cross section of the Earth's atmosphere. Author

N82-15111# Fraunhofer-Inst. fuer Naturwissenschaftlich-Technische Trendanalysen, Euskirchen (West Germany).

SENSOR FOOTPRINTS AND HOMING RANGE OF TERMINAL GUIDANCE MUNITION [SENSOR-FOOTPRINT UND NACHLENKBEREICH BEI ENDPHASENGELENKTER MUNITION]

K.-D. Leuthaeuser and H. Wessel Bonn Bundesministerium der Verteidigund 1981 56 p refs In GERMAN Sponsored by Bundesministerium der Verteidigung

(BMVg-FBWT-81-5) Avail: NTIS HC A04/MF A01; DOK-ZENTBw, Bonn DM 30

The footprints of terminal guidance projectiles were analyzed. These footprints, which correspond to the accessible target range on the surface, depend on the vision range of the sensor and on the homing range of the projectile. The sensor vision range is calculated as a function of trajectory parameters, sensor aperture, and sensor range. The extent of the homing range is determined for the special case of circular trajectories, i.e., proportional navigation, in dependence of flight height, angle of incidence, and maximal transverse acceleration. The resulting footprints are represented in overlay diagrams. Author (ESA)

N82-15112# Technische Hochschule, Aachen (West Germany). Lehrgebiet fuer Verfahren der Prozessdatenverarbeitung und Prozessfuehrung.

***MICROCOMPUTER FOR ATTITUDE CONTROL SYSTEMS* Final Report**

Klaus Werner Plessmann Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 39 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-W-81-040; ISSN-0170-1339) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8,2

The problem of attitude control was examined by investigating the use of single integrated circuits in microcomputers. This consideration results from space availability and maximum electrical power availability. Several 16-bit systems are considered. T.M.

N82-15113# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Raumflugdynamik.

THE ATLAS-C MISSION

J. Puls, R. Naehle, A. Pietrass, H. P. Schmidt, and M. Schroeder Jun. 1981 131 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-735)

(DFVLR-FB-81-19; ESA-TT-735) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 21,30

A spaceflight mission in which a camera will be operated for cartographic purposes above selected test areas is described. The African continent is given as an example. The limited storage capacity of the film, optimal orbits adapted to different focal lengths of the camera objective, and launch and retrieval with the space shuttle are among the topics studied. The satellite system is based on the concept of a small modular subsatellite and thruster platform. J.M.S.

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

N82-15114*# Axiomatix, Los Angeles, Calif.
ENGINEERING EVALUATIONS AND STUDIES. REPORT FOR IUS STUDIES Final Annual Report, 1981
20 Oct. 1981 44 p refs
(Contract NAS9-16067)
(NASA-CR-167459; R8110-3) Avail: NTIS HC A03/MF A01 CSCL 22B

The reviews, investigations, and analyses of the Inertial Upper Stage (IUS) Spacecraft Tracking and Data Network (STDN) transponder are reviewed. Carrier lock detector performance for Tracking and Data Relay Satellite System (TDRSS) dual-mode operation is discussed, as is the problem of predicting instantaneous frequency error in the carrier loop. Coastal loop performance analysis is critiqued and the static tracking phase error induced by thermal noise biases is discussed. R.J.F.

N82-15115*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
SPACE TRANSPORTATION SYSTEM CARGO PROJECTS: INERTIAL STAGE/SPACECRAFT INTEGRATION PLAN. VOLUME 1: MANAGEMENT PLAN
15 Dec. 1981 76 p
(NASA-CR-165068; KSC-K-DPM-09.1-Vol-1) Avail: NTIS HC A05/MF A01 CSCL 22A

The Kennedy Space Center (KSC) Management System for the Inertial Upper Stage (IUS) - spacecraft processing from KSC arrival through launch is described. The roles and responsibilities of the agencies and test team organizations involved in IUS-S/C processing at KSC for non-Department of Defense missions are described. Working relationships are defined with respect to documentation preparation, coordination and aproval, schedule development and maintenance, test conduct and control, configuration management, quality control and safety. The policy regarding the use of spacecraft contractor test procedures, IUS contractor detailed operating procedures and KSC operations and maintenance instructions is defined. Review and approval requirements for each documentation system are described. R.J.F.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

N82-15116*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE AERODYNAMICS OF BODIES IN A RAREFIED IONIZED GAS WITH APPLICATIONS TO SPACECRAFT ENVIRONMENTAL DYNAMICS
Nobie H. Stone Nov. 1981 320 p refs
(NASA-TP-1933; M-361) Avail: NTIS HC A14/MF A01 CSCL 22B

The objectives are to provide a parametric description of the electrostatic interaction of a mesosonic, collisionless plasma with conducting bodies on the order of 1 to 10 Debye lengths in size, and to extend this description to the satellite-ionospheric interaction, where possible. Experimental findings include: the wake of the geometrically complex body appears to be a linear superposition of the wakes of its simple geometric components; and vector ion flux measurements show converging ion streams at the wake axis and direct evidence of ion streams deflected from the wake axis by the positive space charge potential associated with the axial ion peak. The extension to the satellite-ionospheric interaction utilizes qualitative scaling and indicates that similar, but smaller amplitude, wake structures may be expected for small or highly charged bodies. However, for large bodies at small potentials, the structure may be diffused by the thermal ion motion and the dispersion resulting for space charge potentials. T.M.

N82-15117*# Martin Marietta Corp., Bethesda, Md.
CRYOGENIC FLUID MANAGEMENT EXPERIMENT Final Report, Dec. 1978 - Oct. 1981
R. N. Eberhardt, W. J. Bailey, and D. A. Fester Oct. 1981 237 p refs
(Contract NAS3-21591)
(NASA-CR-165495; MCR-81-597) Avail: NTIS HC A11/MF A01 CSCL 22B

The cryogenic fluid management experiment (CFME), designed to characterize subcritical liquid hydrogen storage and expulsion in the low-q space environment, is discussed. The experiment utilizes a fine mesh screen fluid management device to accomplish gas-free liquid expulsion and a thermodynamic vent system to intercept heat leak and control tank pressure. The experiment design evolved from a single flight prototype to provision for a multimission (up to 7) capability. A detailed design of the CFME, a dynamic test article, and dedicated ground support equipment were generated. All materials and parts were identified, and components were selected and specifications prepared. Long lead titanium pressurant spheres and the flight tape recorder and ground reproduce unit were procured. Experiment integration with the shuttle orbiter, Spacelab, and KSC ground operations was coordinated with the appropriate NASA centers, and experiment interfaces were defined. Phase 1 ground and flight safety reviews were conducted. Costs were estimated for fabrication and assembly of the CFME, which will become the storage and supply tank for a cryogenic fluid management facility to investigate fluid management in space. R.J.F.

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N82-15118# British Aerospace Dynamics Group, Stevenage (England). Space and Communications Div.

ELECTROTHERMAL HYDRAZINE THRUSTER Final Report
C. B. Taylor Paris ESA 1981 203 p
(Contract ESTEC-2067/73/HP)
(BAe-RPT/EHT/40212-Vol-1; ESA-CR(P)-1466) Avail: NTIS HC A10/MF A01

An electrothermal hydrazine thruster used for satellite attitude and orbit control was designed. A series of laboratory and engineering models verified mathematical analyses and design concept. The final engineering model showed diminished performance due to a build up of metallic sponge in the screen pack, which caused progressive reduction in gas flow. The contaminant was absorbed by the hydrazine from the supply system and carried in solution to the thruster. Results of 500,000 100 msec pulses show that the required holding condition temperature and pulse mode performance are achieved. Author (ESA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N82-15119*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THERMODYNAMICS AND KINETICS OF THE SULFATION OF POROUS CALCIUM SILICATE
Robert A. Miller and Fred J. Kohl 1981 18 p refs Presented at the Fall Meeting of the Electrochem. Soc., Inc., Denver, 11-17 Oct. 1981
(NASA-TM-82769; E-1023) Avail: NTIS HC A02/MF A01 CSCL 11G

The sulfation of plasma sprayed calcium silicate in flowing SO2/air mixtures at 900 and 1000 C was investigated thermogravimetrically. Reaction products were analyzed using electron microprobe and X-ray diffraction analysis techniques, and results were compared with thermodynamic predictions. The percentage, by volume, of SO2 in air was varied between 0.036 and 10 percent. At 10 percent SO2 the weight gain curve displays a concave downward shoulder early in the sulfation process. An analytical model was developed which treats the initial process as one which decays exponentially with increasing time and the subsequent process as one which decays exponentially with increasing weight gain. At lower SO2 levels the initial rate is controlled by the reactant flow rate. At 1100 C and 0.036 percent SO2 there is no reaction, in agreement with thermodynamic predictions. S.L.

N82-15120# Metallgesellschaft, A.G., Frankfurt am Main (West Germany).
DEVELOPMENT AND TESTING OF MATERIALS FOR SEAWATER DESALINATION PLANTS Final Report, Oct. 1980
Bernd Nichtweiss Bonn Bundesministerium fuer Forschung und Technologie Jan. 1981 157 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-M-81-001; ISSN-0340-8868) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karslruhe, West Germany DM 32,10

An R and D program for decreasing the investment and running costs of a distillation desalinization plant by the development of cheap, reliable and corrosion resistant materials is reported. Production, manufacturing and testing of longitudinally welded nonferrous tubes; profile shaping of heat exchanger tubes for increased heat transfer; production of a plant for laminating the inside of desalinization tubes with plastic; and development of cheap corrosion resistant CuNiFe-alloys and optimization of their welding were investigated. Corrosion test procedures and results are described for various copper and aluminum alloys in seawater loops and in coastal and harbor water. Author (ESA)

N82-15121*# National Bureau of Standards, Washington, D.C.
NBS: MATERIALS MEASUREMENTS Annual Report, 1 Apr. 1980 - 31 Mar. 1981
J. R. Manning Jun. 1981 149 p refs
(NASA Order H-27954B)
(NASA-CR-165076; PB81-238537; NBSIR-81-2295) Avail: NTIS HC A07/MF A01 CSCL 07D

Measurement of materials properties and thermophysical properties is described. The topics discussed are: surface tensions and their variations with temperature and impurities; convection during unidirectional solidification: measurement of high temperature thermophysical properties of tungsten liquid and solid; thermodynamic properties of refractory materials at high temperatures; and experimental and theoretical studies in wetting and multilayer adsorption. Author

24 COMPOSITE MATERIALS

Includes laminates.

N82-15122*# Materials Sciences Corp., Spring House, Pa.
DEVELOPMENT OF AN ENGINEERING ANALYSIS OF PROGRESSIVE DAMAGE IN COMPOSITES DURING LOW VELOCITY IMPACT Final Report, 3 Aug. 1979 - 15 Sep. 1981
E. A. Humphreys Jul. 1981 118 p refs
(Contract NAS1-15888)
(NASA-CR-165778; MSC-TFR-1205/0208) Avail: NTIS HC A06/MF A01 CSCL 11D

A computerized, analytical methodology was developed to study damage accumulation during low velocity lateral impact of layered composite plates. The impact event was modeled as perfectly plastic with complete momentum transfer to the plate structure. A transient dynamic finite element approach was selected to predict the displacement time response of the plate structure. Composite ply and interlaminar stresses were computed at selected time intervals and subsequently evaluated to predict layer and interlaminar damage. The effects of damage on elemental stiffness were then incorporated back into the analysis for subsequent time steps. Damage predicted included fiber failure, matrix ply failure and interlaminar delamination. Author

N82-15123*# Purdue Univ., Lafayette, Ind. Composite Materials Lab.
INDENTATION LAW FOR COMPOSITE LAMINATES
S. H. Yang 31 Jul. 1981 47 p refs
(Grant NsG-3185)
(NASA-CR-165460; CML-81-1) Avail: NTIS HC A03/MF A01 CSCL 11D

Static indentation tests are described for glass/epoxy and graphite/epoxy composite laminates with steel balls as the indentor. Beam specimens clamped at various spans were used for the tests. Loading, unloading, and reloading data were obtained and fitted into power laws. Results show that: (1) contact behavior is not appreciably affected by the span; (2) loading and reloading curves seem to follow the 1.5 power law; and (3) unloading curves are described quite well by a 2.5 power law. In addition, values were determined for the critical indentation, alpha sub cr which can be used to predict permanent indentations in unloading. Since alpha sub cr only depends on composite material properties, only the loading and an unloading curve are needed to establish the complete loading-unloading-reloading behavior. Author

N82-15124*# Materials Sciences Corp., Blue Bell, Pa.
THERMOMECHANICAL RESPONSE OF Gr/Pi COMPOSITES Final Report, 1 Oct. 1979 - 30 Mar. 1981
B. Walter Rosen, Aniruddha P. Nagarkar, and Zvi Hashin Mar. 1981 93 p refs
(Contract NAS1-15841)
(NASA-CR-165753; MSC-TFR-1202/0207) Avail: NTIS HC A05/MF A01 CSCL 11D

The effects of temperature changes upon the stresses and strains in composite laminates having carbon fibers in a polyimide matrix were evaluated. Composites having laminae in which there were nonlinear stress-strain relations for stresses transverse to

the fibers and for axial shear stresses were treated. Material properties were considered to be temperature dependent. Separately, the effects of laminae viscoelastic response were also treated. The results suggest that, for this material, nonlinearities due either to stress or time dependent effects do not appear to be of major practical importance for conventional high temperature composite structures. B.W.

N82-15125*# Old Dominion Univ., Norfolk, Va. Dept. of Mechanical Engineering and Mechanics.
FEASIBILITY STUDY OF DEFORMATION MODES OF DEFORMING COMPOSITE MATERIALS USING VISIOPLASTICITY METHOD Final Report, 16 May - 15 Aug. 1981
Surendra N. Dwivedi Nov. 1981 34 p refs
(Grant NAG1-191)
(NASA-CR-165067) Avail: NTIS HC A03/MF A01 CSCL 11D

The impact resistance and the effect of impact on fiber reinforced composite materials was investigated. The visioplastic method for studying deformation modes and transient impact distribution is described and the basic equations used in the visioplastic method are presented. The subroutine for digitizing the input data and a computer program (STRESS) for calculating the strains and stresses of deforming projectiles are presented. J.D.H.

N82-15126# Comelin, Limours (France).
GROUPE MATRA COMPOSITES CONFERENCE [JOURNEE COMPOSITE DU GROUPE MATRA]
1981 112 p In FRENCH Presented at Velizy, France, 24 Apr. 1981 Original contains color illustrations
Avail: NTIS HC A06/MF A01

Technology based on the use of composite materials is reviewed. Various topics include: composite structures; applications of composites in missiles; and quality control. Filament winding and manufacturing stamping tools of resin are also discussed. For individual titles, see N82-15127 through N82-15133.

N82-15127# Engins Matra, Velizy (France).
STUDY AND DEVELOPMENT OF HIGH STRENGTH COMPOSITE MATERIAL STRUCTURES BY THE THERMO-MECHANICAL DEPARTMENT OF THE SPACE DIVISION OF MATRA [ETUDES ET DEVELOPPEMENT DE STRUCTURES EN MATERIAUX COMPOSITES A HAUTES CARACTERISTIQUES REALISEES PAR LE DEPARTEMENT MECANIQUE ET THERMIQUE DE MATRA DIVISION ESPACE]
J. P. Allard *In* COMELIN Groupe Matra Composites Conf. 1981 26 p In FRENCH (For primary document see N82-15126 06-24)
Avail: NTIS HC A06/MF A01

Equipment structures were developed, using fiber reinforced composite materials with elevated mechanical characteristics and low coefficients of thermal expansion. Structures for the Ariane launch vehicle nose cone, for an optical measuring device, and for the SPOT satellite sensor are discussed. Design problems linked to materials used in space structures are identified. Composite materials are compared with metals. Results illustrate material selection criteria in terms of low weight and high rigidity. Dimensional stability is expressed as a function of the coefficient of thermal expansion. Examples of composite assemblies (riveted; bolted; tongue in groove) are shown. Author (ESA)

N82-15128# Engins Matra, Velizy (France). Dept. Mecanique et Structure.
APPLICATIONS OF COMPOSITES IN MISSILES AND MISSILE LAUNCHERS [APPLICATIONS COMPOSITES AUX MISSILES ET LANCES-MISSILES]
M. Rouillot *In* COMELIN Groupe Matra Composites Conf. 1981 14 p In FRENCH (For primary document see N82-15126 06-24)
Avail: NTIS HC A06/MF A01

Conditions under which application of resin-fiber composite materials is possible are defined. Materials were characterized (thermomechanical, electrical, electromechanical and aging properties) and their utilization was examined. Results show that applications of composites in missiles and missile launchers are much more limited than in aircraft manufacturing. In particular, for short-range missiles of small diameter, composites are not as cost effective as metal materials, e.g., aluminum. However, when weight reduction is of primary concern, wider use of composites can be expected. Author (ESA)

N82-15129# Comelin, Limours (France).
STUDY OF HIGH QUALITY COMPOSITE MATERIALS AT LIMOURS, FRANCE [LES MATERIAUX COMPOSITES A HAUTES PERFORMANCES A LIMOURS]
G. Gelay *In its* Groupe Matra Composites Conf. 1981 8 p In FRENCH (For primary document see N82-15126 06-24)
Avail: NTIS HC A06/MF A01

The organization of R and D in composite materials and structures is discussed. Advantages in the use of composites are cited and the fabrication of various parts, particularly the series production of a missile fin, is described. Technologies used, i.e. bonding and molding, are considered. An adequate quality control methodology is also outlined. Author (ESA)

N82-15130# Engins Matra, Velizy (France).
QUALITY CONTROL OF COMPOSITES: ACTIVITIES AND INSTITUTED MEANS [QUALITE CONTROLE DES COMPOSITES: ACTIONS ET MOYENS MISES EN OEUVRES]
A. Pays and P. deRigne *In* COMELIN Groupe Matra Composites Conf. 1981 19 p In FRENCH (For primary document see N82-15126 06-24)
(N-25.855/R.E.Q.C.) Avail: NTIS HC A06/MF A01

Quality control of raw materials, of the fabrication process, and of the finished composite part is described. The organization of a quality control methodology is considered. Raw material quality characteristics are defined. Parameterization of composite materials fabrication is explained. The testing of finished materials is discussed. Three methods are presented: thermal analysis; scanning electron microscopy; and nondestructive examination by ultrasonics. Author (ESA)

N82-15131# Manurhin (France).
FILAMENT WINDING [L'ENROULEMENT FILAMENTAIRE]
Pierre Huber *In* COMELIN Groupe Matra Composites Conf. 1981 22 p In FRENCH (For primary document see N82-15126 06-24)
Avail: NTIS HC A06/MF A01

Filament wound construction of tubes and containers is discussed. Materials used (reinforcing; thermosetting resins) and manufacturing equipment are described. Kinematic operating principles of a winding machine with constant, or nonlinear, advance are considered. Peripheral machines (bobbin controller; impregnation device; drier; combing devive) are also treated. Filament choice is reviewed along with stress calculation methods. Quality control is also covered. Author (ESA)

N82-15132# LeBranchu (Rene) et Fils S.A., Courbevoie (France).
STAMPING TOOLS MADE OF RESIN [OUTILLAGES D'EMBOUTISSAGE EN BETON DE RESINE]
J. L. Billet *In* COMELIN Groupe Matra Composites Conf. 1981 8 p In FRENCH (For primary document see N82-15126 06-24)
Avail: NTIS HC A06/MF A01

Fabrication of die press tools, using epoxy resins, is described. These tools can be employed on hydraulic presses (50 to 2000 MT) with maximum platen dimensions of 3250 x 2500 mm. The use of three types of composite tool is discussed: standard resin, high strength resin, and mixed metal/resin. Mechanical characteristics are given. The design and manufacturing of these tools are considered for cost and delivery delay. Author (ESA)

N82-15133# MATRA Automobile, Salbris (France).
MATRA AUTOMOBILES: THEILLAY CENTER [PRESENTATION DES TECHNIQUES DE MOULAGE UTILISEES AU THEILLAY]
M. Caussin *In* COMELIN Groupe Matra Composites Conf. 1981 7 p In FRENCH (For primary document see N82-15126 06-24)
Avail: NTIS HC A06/MF A01

A manufacturing installation which produces glass fiber reinforced plastic structures is described. Molding technology is discussed. Besides economic aspects, the development of molding technology for quality and rapidity is reviewed. The capacity of the plant and quality control methodology are revealed. Author (ESA)

N82-15134# Technische Hochschule, Aachen (West Germany). Inst. fuer Kunststoffverabeitung in Industrie und Handwerk.
SELECTION AND TESTING OF SUITABLE COATING SYSTEMS FOR STEEL PIPES USED FOR LONG DISTANCE HEAT TRANSFER Final Report, May 1980
Ernst Braches Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 85 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-138; ISSN-0340-7608) Avail: NTIS HC A05/MF A01

Anticorrosion properties of buried, plastics-coated steel pipes for long-distance heat supply lines, with regard to the possible application limits are considered. Quantitative measuring methods were used to determine the influence of various media, temperatures, and temperature changes on the protective effect of the composites systems. Electrochemical measuring methods (impedance and potential measurement), bond strength measurements and optical tests were employed. It was possible to achieve a very good differentiation between the level of protection offered by the individual coating systems and show how they were affected by the various kinds of stress applied. The electrochemical measuring methods, in particular, were outstandingly suitable for a quasi-nondestructive evaluation of a composite system subjected to various stresses. It was also possible to show that the PU coating system did not lose any of its protective properties in any of the tests. J.M.S.

N82-15135# Oak Ridge National Lab., Tenn.
TESTING RESULTS OF MF-NbSUB3Sn
S. S. Shen and W. K. McDonald 1981 10 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10 Aug. 1981 Prepared in cooperation with Teledyne Wah Chang
(Contract W-7405-eng-26)
(DE81-028632; CONF-810835-7) Avail: NTIS HC A02/MF A01

A new method to produce multifilamentary (MF) Nb3Sn superconductor called modified jellyroll has been recently developed by Teledyne Wah Chang, Albany. The novel technique shows real promise to simplify the manufacture of MF superconducting wires. Unlike the conventional, internal bronze process which employs niobium in either rod or tube form, modified jellyroll (MJR) uses an expanded niobium foil in its billet assembly. Simply by rolling thin expanded niobium foil along with other metal sheets, as desired (e.g., copper, bronze, tantalum, etc.), into a jellyroll form, the resultant billet can then be extruded and processed as conventional wires. This paper presents results of systematic evaluation tests performed on such composites. The results are analyzed and discussed in terms of critical current density, diffusion time constant, ac losses (magnetization), and the effective filamentary diameter. DOE

N82-15136# Mound Lab., Miamisburg, Ohio.
DISSOLUTION OF SURFACE OXIDE LAYERS ON TITANIUM AND TITANIUM SUBHYDRIDE BETWEEN 25 AND 700 C
T. N. Wittberg (Dayton Univ.) and P. S. Wang 1981 18 p refs Presented at the 11th Symp. on Explosives and Pyrotechniques, Philadelphia, 15 Sep. 1981
(Contract DE-AC04-76DP-00053)
(DE81-028044; MLM-2856-OP; CONF-810926-4) Avail: NTIS HC A02/MF A01

The surface sensitive, spectroscopic techniques of Auger electron spectroscopy (AES) and X-ray photoelectron spectroscopy (XPS) have been applied to the study of oxide dissolution on titanium and titanium subhydride. It was shown that the rate of oxygen dissolution into titanium increased sharply at about 350 C temperatures at which an exothermic reaction, corresponding to the reaction of free titanium with atmospheric oxygen, was occurring. The work has been expanded to include studies of TiH/ sub x/ (x = 1.15, 1.62). It was found that dissolution of the native oxide on titanium subhydride occurs at a substantially higher temperature (about 500 C) than for titanium. It appears that the onward diffusion of hydrogen is inhibiting the inward diffusion of oxygen on the subhydride samples below 500 C. Studies in the range of 300 to 350 C have shown a semilogarithmic relationship between the surface oxygen level and the time at temperatue, in agreement with earlier gravimetric studies on titanium oxidation in this tempeature range. DOE

N82-15137# Sandia Labs., Albuquerque, N. Mex.
HIGH-TEMPERATURE ELECTRICAL CONDUCTIVITY AND THERMAL DECOMPOSITION OF PHENOLIC AND SILICON BASED DIELECTRICS FOR FIRESET HOUSINGS
R. T. Johnson, Jr. and R. M. Biefeld Aug. 1981 67 p refs
(Contract DE-AC04-76DP-00789)
(DE81-031919; SAND-81-0786) Avail: NTIS HC A04/MF A01

The temperature dependence of the electrical conductivity and thermal decomposition characteristics of several phenolic- and silicone-based materials of interest for fireset case housings have been measured to 600 C to 700 C. The materials are phenolic or silicone resins reinforced with glass chopped fabric or cloth. The conductivity temperature dependence was measured during decomposition in a nitrogen atmosphere at a heating rate of approximately 10 C/minute. Applied electric fields were from 4 x 400 to 4000 volts/cm. Thermal decomposition characteristics were investigated by mass spectroscopy in vacuum and thermal gravimetric analysis in nitrogen and air. Nearly ohmic voltage-current characteristics were obtained, except where decomposition and/or outgassing was pronounced. DOE

N82-15138# Ecole Nationale Superieure de Techniques Avancees, Paris (France).
STUDY OF TRACTION RUPTURE STRENGTH OF GRAPHITE-EPOXY COMPOSITE MATERIAL LAMINATES T300/5208, WITH AND WITHOUT A CENTRAL HOLE Ph.D. Thesis - Univ. of Technol. de Compiegne, France [ETUDE JUSQU'A RUPTURE EN TRACTION DE STRATIFIES EN MATERIAU COMPOSITE GRAPHITE-EPOXY T 300/5208, AVEC OU SANS TROU CENTRAL]
Tat Sinh Vong Sep. 1980 283 p refs In FRENCH; ENGLISH summary
(Rept-137) Avail: NTIS HC A13/MF A01

Composite laminated plates were subjected to traction uniaxial loading and their failure behavior was studied. Theory is proposed for specimen geometry effects, i.e., free edges, stacking sequence, and hole diameter. Load transfer mechanisms and damage propagation to complete failure are explained by a variational approach to the uniform extension problem. Tensile test results are interpreted with the T300/5208 graphite-epoxy unidirectional composite taken as a transverse isotropic material and all the elastic moduli are found. Experiments confirm that the hole diameter effect can be predicted with an approximation. Analysis based on the finite element method gives the distribution of the in-plane stresses within each ply (distant, near or around the hole). An incremental procedure determines the propagation of damage and the stress redistribution of broken fibers; the initiation of damage is shown to be near the hole and perpendicular to the tension axis. Author (ESA)

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics*.

N82-15139*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.
CHEMICAL MODIFICATION OF TiO2 SURFACES WITH METHYLSILANES AND CHARACTERIZATION BY INFRARED ABSORPTION SPECTROSCOPY
Harry O. Finklea and R. Vithanage [1982] 14 p refs
(Grant NAG1-89)
(NASA-CR-165063) Avail: NTIS HC A02/MF A01 CSCL 07D

Infrared absorption spectra of methylsilanes bonded to a TiO2 powder were obtained. The reacting silanes include Me sub (4-n)SiX sub n (n = 1-4; X = Cl, OMe) and hexamethyldisilazane (HMDS). Reactions were performed on hydroxylated-but-anhydrous TiO2 surfaces in the gas phase. IR spectra confirm the presence of a bonded silane layer. Terminal surface OH

groups are found to react more readily than bridging OH groups. By-products of the modification adsorp tenaciously to the surface. The various silanes show only small differences in their ability to sequester surface OH groups. Following hydrolysis in moist air, Si-OH groups are observed only for the tetrafunctional silanes. Author

N82-15140*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Chemistry.

CHEMICAL MODIFICATION OF SEMICONDUCTOR SURFACES Final Report, 1 Sep. 1980 - 30 Nov. 1981

Harry O. Finklea 30 Nov. 1981 3 p

(Grant NAG1-89)

(NASA-CR-165066) Avail: NTIS HC A02/MF A01 CSCL 07D

Results of research on the chemical modification of TiO2 powders in the gas phase and the examination of the modified powders by infrared absorption spectroscopy are comprehensively summarized. The range of information obtainable by IR spectroscopy of chemically modified semiconductors, and a definition of the optimum reaction conditions for synthesizing a monolayer of methylsilanes using vapor phase reaction conditions were considered. M.D.K.

N82-15141# Eisen und Metall A.G., Gelsenkirchen (West Germany).

RECOVERY OF RAW MATERIALS BY PYROLYSIS Final Report

Bernd Andreas, Walter Birckenstaedt (VEBA OEL AG), Gerd-Peter Bracker (Mannesmann Veba Umwelttechnik GmbH), Erich Michel (Mannesmann Veba Umwelttechnik GmbH), Gerd Collin (Ruetgerswerke AG), Georg Grigoleit (Ruetgerswerke AG), and Maximilian Zander (Ruetgerswerke AG) Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 264 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-017; ISSN-0340-7608) Avail: NTIS HC A12/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 42.80

With the conventional pyrolysis technologies it was formerly possible to treat one specific waste only. A new technology which enables to process a great number of hydrocarbonaceous industrial wastes, even in mixture was developed. The technology was developed in both, a laboratory and in a testing plant with a capacity of 200 kg/h and within 3000 operating hours successfully proved. Residues from car shredding plants, plastics, used cables and acid tars were pyrolysed separately as well as in a mixture. The pyrolysis products thus gained are upgraded in a succeeding stage to meet market demands or for use in a secondary refinery. The calculation of profitability for a large plant proves that a balanced operating result can be reached. In industrial areas this technology will play an important part with regard to waste disposal as well as resource recovery. Author

N82-15142# Walther Cie A.G., Cologne (West Germany).

PROCESS FOR REMOVING SULFUR OXIDES FROM GASES WITH DIRECT PRODUCTION OF A USABLE FINISHED REACTION PRODUCT Final Report, Oct. 1980

Heinz Juergen Fischer and Georg Kremer Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 38 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-102; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8

During the described phase of testing, the waste-water-free Walther-process could be advanced considerably and tried in the final process conception after a coal-fired power-station block. The ammonia sulfate obtained as a waste-product, meets the requirements of the fertilizer industry. Further processing of this pulverous waste-product to obtain a marketable end-product was investigated and demonstrated in a pelletizing unit with subsequent drying in a drum-type drier. The possibility of reheating the gases in a FGD-plant (flue-gas desulfurization plant) without application of energy from foreign source was proven by the use of a regenerative heat exchanger. As regards spray-drying, a variant was investigated: a partial flow of the high-temperature flue-gas was branched before the airheater and spray-drying of the oxidized scrubbing liquid resulting from the desulfurization process was carried out in this partial flow. Author

N82-15143# Stuttgart Univ. (West Germany). Physikalisches Inst., Teil 4.

MATERIALS CHARACTERIZATION OF SILICON AND ANALYSIS OF COMBINATION PROCESSES AND IMPURITIES Final Report, Jul. 1980

Wolfgang Schmid and Manfred H. Pilkuhn Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 80 p refs Partly in GERMAN; Partly in ENGLISH Sponsored by Bundesministerium fuer Forschung und Technologie und Deutsche Forschungsgemeinschaft

(BMFT-FB-T-81-114; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16.80

Photoluminescence of silicon is discussed as a method of materials characterization, and an analysis of impurities, defects and lifetimes is made. The nature and concentration of shallow impurities can be determined by bound exciton luminescence. In silicon, an isoelectronic defect was discovered and investigated. Silicon liquid phase epitaxy layers were produced for the investigation of the deep acceptor In. These layers exhibited significant changes in the defect properties, e.g., discrete donor acceptor pair spectra. A quantitative relation between minority carrier lifetime and the concentration of majority carriers was determined for a device modelling. The case of the simultaneous presence of gold recombination centers was of particular interest. M.G.

N82-15144# Siemens A.G., Munich (West Germany). Forschungslab.

ON TWO-SIX THIN FILM TECHNOLOGY FOR THE PREPARATION OF ACTIVE LUMINESCING AREAS Final Report, Dec. 1979

Dietmar Theis Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 71 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-118; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15

For many display applications active, flat solid state panels are gaining increasing interest. The aim of this investigation was the determination of the relevant preparational parameters as well as the electro-optic characterization of the transducer. Electroluminescing MISIM (metal-Al2O3 - II-VI semiconductor - Al2O3-metal) structures were prepared by sputtering and evaporation techniques. The most efficient layers were produced with yellow emitting ZnS:0.5 weight percent Mn films. Luminance values above 3000 cd/sq m, good multiplexability due to extremely nonlinear voltage-brightness relation and luminous efficiency of 0.5 lm/W could be achieved. The long-time stability of the devices, however, still has to be improved. Author

N82-15145# Brigham Young Univ., Provo, Utah. Dept. of Chemical Engineering.

THE ELECTROCHEMISTRY OF MOLTEN LITHIUM CHLORATE AND ITS POSSIBLE USE WITH LITHIUM IN A BATTERY

Su-Chee Simon Wang and Douglas N. Bennion Dec. 1980 36 p refs Submitted for publication

(Contract N00014-80-C-0345; NR Proj. 359-551)

(AD-A105968; BYU-TR-1) Avail: NTIS HC A03/MF A01 CSCL 07/4

Lithium chlorate, LiClO3, has a reported melting point of 127.6 C or 129 C. The specific conductance of molten lithium chlorate is relatively high compared to most electrolytic solutions used at room temperature. Therefore, lithium chlorate offers the chance to operate a new lithium battery system at a temperature between 130 C and 150 C. It is found from experiments that lithium chlorate is stable in the potential range between 3.2 V and 4.6 V. A Li-Cl2 secondary battery system has an open circuit potential of 3.97 V, making a Li-Cl2 secondary battery in molten lithium chlorate, in principle, possible. Lithium negative electrode performance is hindered by corrosion and possible runaway reactions with LiClO3 and dendrite formation on charging. The solubility of Li2O and LiCl in LiClO3 at 145 C is .000075

mol/cubic cm and .00178 mol/cubic cm respectively. The diffusion coefficients are 1.5 x 10 to the -7th power sq cm/s for Li2O and 3.4 x 10 to the -7th power sq. cm/s for LiCl. Platinum appeared to be an inert positive electrode for chlorate, chlorine, or oxygen reactions for short term runs, order of several hours. Nickel shows active-passive behavior and appears suitable for primary cell, cathodic discharge of LiClO3, but not suitable for a Cl2 or O2 electrode. GRA

N82-15146# Duke Univ., Durham, N. C. Dept. of Chemistry.
STEREOCHEMISTRY OF REACTION INVOLVING CYCLIC PEROXIDES Final Report, 1 May 1978 - 30 Apr. 1981
Ned A. Porter 25 Sep. 1981 11 p refs
(Grant NSF CHE-77-26088)
(AD-A105999; ARO-15618.1-C) Avail: NTIS HC A02/MF A01 CSCL 07/4

Several aspects of chemistry related to autoxidation, peroxy free radicals, and peroxides have been explored. Methods for preparation of complex unsaturated hydroperoxides have been developed and peroxy radicals derived from these hydroperoxides were studied as models for polyunsaturated fatty acid and polyolefin (i.e., polybutadiene and polyisoprene) autoxidation. We have established that peroxy radical cyclization and bicyclization occurs in models of polyunsaturated fatty acid oxidation and a new type of cyclization, serial cyclization, has been observed in polybutadiene oxidation models. Kinetic and stereochemical aspects of these cyclization reactions have been explored. The free radical oxidation of polyunsaturated fatty acids has been studied mechanistically. In particular, we believe that the H atom donating ability of the medium in which oxidation occurs is an important factor in determining the partitioning of peroxy free radicals between competitive pathways (i.e., beta scission and cyclization). The results of these studies provide a firm basis for understanding the degradation of materials, foodstuffs, etc. Author (GRA)

N82-15147# North Carolina Univ. at Chapel Hill. Lab. of Chemistry.
CHEMICALLY MODIFIED ELECTRODES FOR ELECTROCATALYSIS
Royce W. Murray 8 Sep. 1981 39 p refs Prepared for publication
(Contract N00014-76-C-0817; NR Proj. 350-623)
(AD-A105563; TR-18) Avail: NTIS HC A03/MF A01 CSCL 07/4

At a modified electrode, electrocatalysis is accomplished by an immobilized redox substance acting as an electron transfer mediator between the electrode and a reaction substrate. Such mediated electrocatalysis is possible with monomolecular and multimolecular layers of the redox substance. The electron transfer mediation can assume several special forms which are identified and experimental examples are given. The differences between electrocatalytic behavior of monomolecular and multimolecular layers are discussed; electrocatalysis in the latter circumstance can include reaction rate elements of electrochemical charge and substrate migration through the multilayer in addition to the chemical rate. Theoretical ideas are presented which interconnect these three rate elements, to show that either all of the multilayer sites can participate in the electrocatalytic reaction, or only ca. a monolayer's worth, depending on the relative rates of the electrochemical charge transport, the diffusion of the substrate, and the chemical reaction rate. Author (GRA)

N82-15148# Westgate Research Corp., Los Angeles, Calif.
CHEMISTRY AND APPLICATION OF OZONE AND OZONE/UV LIGHT FOR WATER REUSE Final Technical Report, 15 Sep. 1979 - 15 Sep. 1980
E. Leitis, J. D. Zeft, and M. M. Smith 8 May 1981 152 p refs
(Contract DI-14-34-0001-9436)
(PB81-238578; W81-04656; OWRT-C-90110-R(9436)(1); OWRT/RU-80/14) Avail: NTIS HC A08/MF A01 CSCL 07D

Ways to reduce fixed and operating costs of ultraviolet light (UV) enhancement of ozone (03) oxidation of refractory organics in wastewater and the chemistry involved as well as the predictability of degradation rates for different classes of refractory compounds were investigated. Major emphasis was placed on: (1) role of UV wavelength and intensity on the oxidation rate of organics; (2) effect of pH and concentration of substrates on ozonation and UV ozonation rates; and (3) feasibility of using Oc/UV to oxidize phenanthrene, used as a model compound of polyclear aromatic hydrocarbons found in synthetic fuel wastewater. Experimental results indicate that there is a concerted attack by UV light and ozone on the carbon-halogen bond, followed by a reaction of the dehalogenated carbon with ozone. Additional results are described. GRA

N82-15149# Brookhaven National Lab., Upton, N. Y.
SEPARATION OF HYDROGEN ISOTOPES VIA SINGLE COLUMN PRESSURE SWING ADSORPTION
Y. W. Wong and F. B. Hill 1981 8 p refs Presented at the 2nd World Congr. of Chem. Eng., Montreal, 4 Oct. 1981
(Contract DE-AC02-76CH-00016)
(DE81-015658; BNL-29364; CONF-811007-2) Avail: NTIS HC A02/MF A01

Separation of hydrogen isotopes based on kinetic isotope effects was studied. The mixture separated was hydrogen containing a trace of tritium as HT and the hydride was vanadium monohydride. The separation was achieved using the single-column pressure swing process. Stage separation factors are larger and product cuts smaller than for a two-column pressure swing process operated in the same monohydride phase. DOE

N82-15150# Brookhaven National Lab., Upton, N. Y.
PHOTOTHERMAL SPECTROSCOPY OF AEROSOLS
Anthony J. Campillo and Horn Bond Lin Apr. 1981 10 p refs Presented at the SPIE Tecnical Symp., Washington, D.C., 20 Apr. 1981 Submitted for publication
(Contract DE-AC02-76CH-00016)
(DE81-026098; BNL-29792; CONF-8104104-1) Avail: NTIS HC A02/MF A01

In situ aerosol absorption spectroscopy was performed using two novel photothermal detection schemes. The first, based on a photorefractive effect and coherent detection, called phase fluctuation optical heterodyne spectroscopy, yields, depending on the geometry employed, particle specific or particle and gas absorption data. Single particles of graphite as small as 1 micrometer were detected in the particle specific mode. In another geometrical configuration, the total absorption (both gas and particle) of submicron sized aerosols of ammonium sulfate particles in equilibrium with gaseous ammonia and water vapor were measured at varying CO2 laser frequencies. The second scheme is a hybrid visible Mie scattering scheme incorporating photothermal modulation. Particle specific data on ammonium sulfate droplets were obtained. DOE

N82-15151# Stanford Linear Accelerator Center, Calif.
EXCLUSIVE PROCESSES IN QUANTUM CHROMODYNAMICS
Stanley J. Brodsky and G. Peter Lepage Jun. 1981 26 p refs Presented at the Conf. on Perturbative QCD, Tallahassee, Florida, 25-28 Mar. 1981
(Contract DE-AC03-76SF-00515)
(DE81-028233; SLAC-PUB-2762; CONF-810368-4) Avail: NTIS HC A03/MF A01

Large momentum transfer exclusive processes and the short distance structure of hadronic wave functions are systematically analyzed within the context of perturbative quantum chromodynamics (QCD). Predictions for meson form factors, two photon processes gamma gamma yield M anti M, hadronic decays of heavy quark systems, and a number of other related QCD phenomena are reviewed. DOE

N82-15152# Oak Ridge National Lab., Tenn.
THERMOLYSIS OF NAPHTHOLS
M. L. Poutsma and C. W. Dyer 1981 6 p refs Presented at the Intern. Conf. on Coal Sci., Dusseldorf, 7 Sep. 1981
(Contract W-7405-eng-26)
(DE81-029684; CONF-810914-6) Avail: NTIS HC A02/MF A01

A significant portion of the oxygen content of native coals and of the coal-derived liquids used as process solvents during hydroliquefaction of coal is present as phenolic hydroxyl groups. Various reported phenomenological effects of the phenolic content of process solvents on liquefaction performance were reviewed.

Background data concerning the chemical behavior of phenols under conditions representative of liquefaction were found lacking. The thermolysis of representative phenols under carefully defined conditions was studied. The behavior of the isomeric naphthols at 400 C in the absence of any purposely added reagents or catalysts is described. The results reveal a set of previously unrecognized thermal reactions by which phenols may be condensed to furans, be deoxygenated to arenes, and serve as hydrogen donors. These processes, the latter two generally desirable and the former one undesirable, are inherently related. M.D.K.

N82-15153# Pacific Northwest Lab., Richland, Wash. Physical Sciences Dept.

PRECISE TRACE RARE EARTH ANALYSIS BY RADIOCHEMICAL NEUTRON ACTIVATION

J. C. Laul, E. A. Lepel, W. C. Weimer, and N. A. Wogman Jun. 1981 19 p refs From the Modern Trends in Activation Anal. Conf., Toronto, 15-19 Jun. 1981 Submitted for publication
(Contract DE-AC06-76RL-01830)
(DE81-030009; PNL-SA-9143; CONF-8106153-1) Avail: NTIS HC A02/MF A01

A rare Earth group separation scheme followed by normal Ge(Li), low energy photon detector (LEPD), and Ge(Li)-NaI(T1) coincidence-noncoincidence spectrometry, significantly enhances the detection sensitivity of individual rare Earth elements (REE) at or below the ppB level. Based on the selected gamma ray energies, normal Ge(Li) counting is favored for 140La, 170Tb, and 169Yb; LEPD is favored for low gamma ray energies of 147Nd, 153Sm, 166 Ho, and 169Yb; and noncoincidence counting is favored for 141Ce, 143Ce, 142Pr, 153Sm, 171Er, and 175Yb. The detection of radionuclides 152mEu, 159Gd, and 177 Lu is equally sensitive by normal Ge(Li) and noncoincidence counting; 152Eu is equally sensitive by LEPD and normal Ge(Li); and 153Gd and 170Tm are equally favored by all the counting modes. Noncoincidence counting is favored for most of the REE. Precise measurements of the REE were made in geological and biological standards. DOE

N82-15154# Belgrade Univ. (Yugoslavia). Inst. for Electrochemistry.

OXIDATION OF FORMIC ACID AND METHANOL ON SINGLE CRYSTAL PLATINUM ELECTRODES

R. R. Adzic, A. V. Tripkovic, and W. E. Grady (Brookhaven National Lab.) 1981 13 p refs Presented at the Symp. on Electrocatalysis, Minneapolis, 10-15 May 1981
(Contract DE-AC02-76CH-00016)
(DE81-028330; BNL-29817; CONF-8105105-3) Avail: NTIS HC A02/MF A01

The oxidation of formic acid and methanol involves strong adsorption prior to the charge transfer process and the intermediates formed in these reactions are even more strongly adsorbed. It was found that these processes are highly dependent on the surface orientation of the single crystal electrodes. The highest activity has been found with (111) orientation and the lowest with (100). The highest activity of (111) orientation was explained with the low hydrogen adsorption on this plane, and the low adsorption of strong bond intermediates which require two or three sites for their adsorption. This more than compensates for the low reactivity of the (111) plane toward formic acid and methanol themselves. Further studies of this oxidation are summarized. M.D.K.

N82-15155# Central Electricity Generating Board, Southampton (England). Engineering Labs.

INTERFACIAL STRUCTURES IN NICKEL-BASED TRANSITION JOINTS AFTER LONG TERM SERVICE

R. D. Nicholson Sep. 1980 25 p refs
(DE81-903971; RD/M/N-1131) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

Three transition joints were examined after service of between 57,087 and 65,396 hours at temperatures of 570 to 605 C. Specimens were examined using microhardness, optical and scanning electron microscopy (SEM). Variations in chemical composition across the joints were determined using the EDAX attachment on the SEM. For detailed examination of the ferritic/weld metal interface, carbon extraction replicas were examined in the transmission electron microscope and selected area electron diffraction and EDAX analysis used to identify the precipitates. The effects of renormalizing for 1/2 hour at 960 C and subsequently stress relieving for 3 hours at 700 C on the interfacial structure of the joints were also investigated. Factors determining the interfacial structures are discussed and a mechanism for the formation of the long term aged structure is suggested. DOE

N82-15156# California Univ., Livermore. Lawrence Livermore Lab.

USE OF ALKALI METAL-ACID PHOSPHATES FOR ELEVATED TEMPERATURE WATER ELECTROLYSIS

P. Shell, Margaret Steinbugler, and Oscar H. Krikorian 31 Aug. 1981 4 p Presented at the Intern. Energy Agency Annex 1 Workshop on Thermochem. Hydrogen, Juelich, West Germany 23-25 Sep. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE81-029607; UCRL-86623; CONF-810942-3) Avail: NTIS HC A02/MF A01

The use of molten salts containing water as electrolytes for the high temperature electrolysis of water is being investigated as part of a research program on thermochemical cycles for the production of hydrogen. The behavior of phosphate-based electrolytes during electrolysis was observed. The cell potential was measured as a function of time at constant current densities up to 1 A/cu cm using platinum electrodes. The cell resistance monitored before and after polarization in order to correlate the electrolyte conductivity to the degree of dehydration. The following characteristics of the electrolyte were observed: tendency to dehydrate in an open container; dehydration effect was most pronounced in the sodium-and lithium-based electrolytes, with the potassium-based electrolytes showing a relatively slow dehydration rate; tendency of the sodium-and lithium-based electrolytes to become viscous and form hard crusts on the electrolyte surface; the potassium electrolyte did not form these viscous melts or surface crusts; lowest cell potentials were obtained for the sodium- and potassium-based electrolytes at 300 and 350 C. DOE

N82-15157# Pennsylvania State Univ., University Park. Dept. of Chemistry.

MECHANISTIC STUDIES OF CARBON MONOXIDE REDUCTION Progress Report, 1 Aug. 1980 - 1 Aug. 1981

Gregory L. Geoffroy 20 Jul. 1981 42 p refs
(Contract DE-AC02-79ER-10345)
(DE81-030063; DOE/ER-10345/2) Avail: NTIS HC A03/MF A01

The mechanisms by which carbon monoxide is reduced by hydrogen on the surface of metal particles and in homogeneous solutions is investigated. The mechanism of the heterogeneous, metal particle catalyzed reduction of carbon monoxide is investigated by using transition metal cluster complexes to model the metal surfaces. The mechanism of synthesis gas chemistry is carried out in homogeneous solution, focusing on a few key mechanistic steps. Methanol homologation reaction is considered. Progress reports are presented for stepwise reduction of CO to CH4 on a triosmium cluster face; conversion of Os3(CO)11 (muCH2) into H2Os3(CO)g(CCO) - a model for chain growth on metal surface; structures of tetranuclear FeRu clusters as models for CO activation; reactions directed toward the preparation of acyl and alkyl substituted clusters; and fragmentation of tetranuclear mixed metal clusters by reaction with CO. DOE

N82-15158# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.

ALPHA-SPECTROSCOPIC TECHNIQUES FOR FIELD MEASUREMENT OF RADON DAUGHTERS

W. W. Nazaroff, A. V. Nero, and K. L. Revzan Jun. 1981 15 p refs Presented at the 2nd Spec. Symp. on Nat. Radiation Environ., Bombay, 19-23 Jan. 1981
(Contract W-7405-eng-48)
(DE81-029846; LBL-10769; CONF-810153-1) Avail: NTIS HC A02/MF A01

Alpha spectroscopic techniques using portable instruments to measure the low concentrations of radon daughters typically found indoors are evaluated. One of two procedures may be used, two-count or single-count, depending on whether precision of measurement or rapidity of measurement is the more

important objective. The two-count method permits individual radon daughter concentrations to be measured at the low level of one picocurie per liter with a relative standard deviation of about 20 percent within a total measurement time of 40 minutes (assuming the product of detector efficiency and sampling flow rate is one liter per minute). With the single-count procedure, using the same assumption, potential alpha energy concentration can be estimated within a total measurement time of 11 minutes with less than 20 percent relative procedural error for common equilibrium conditions; the relative standard deviation is about 20 percent at 0.005 working level. These findings are compared with results obtained by other commonly used procedures. DOE

N82-15159# Stanford Linear Accelerator Center, Calif.
QUARKONIUM SPECTROSCOPY
Daniel L. Scharre Jun. 1981 86 p refs Presented at the Intern. Conf. on Phys. in Collision: High Energy ee/ep/pp Interactions, Blacksburg, Va., 28-31 May 1981
(Contract DE-AC03-76SF-00515)
(DE81-028229; SLAC-Pub-2761; CONF-8105109-1) Avail: NTIS HC A05/MF A01

Recent experimental investigations of heavy quark-antiquark bound state systems are reviewed. Results from SPEAR on charmonium spectroscopy and from DORIS and CESR on bottomonium spectroscopy are presented. The current status of the search for top is also discussed. DOE

N82-15160# AEG-Telefunken, Frankfurt am Main (West Germany). Forschungsinst.
MICROANALYSIS BY ELECTRON-SPINNING SPECTROMETER FOR MATERIAL AND PROCESS CONTROL IN SEMICONDUCTOR TECHNOLOGY Final Report, Mar. 1980
Horst Neubrand Bonn Bundesministerium fuer Forschung und Technologie Dec. 1980 82 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-80-193; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17,20

A K-band electron spin resonance (ESR) spectrometer for high sensitivity detection of impurities in silicon semiconductor slices was constructed. Spectrometer characteristics are superheterodyne detection, low frequency field modulation, and variable sample temperature between 4 and 300K. Detection sensitivity is, e.g., 2 exp 11 P cm exp (-3), 4 exp 10 Fe cm exp (-3), with sample dimensions of 1.7 X 2.3 X 0.04 cm exp 3. The time needed for sample change and spectrum registration is about one hour. The occurence and the behavior of iron in silicon after high temperature processes were investigated with the ESR spectrometer. The time dependent pairing of iron and boron in silicon samples at room temperature was studied. Author (ESA)

N82-15161# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
INVESTIGATION BY MEANS OF LASER MAGNETIC RESONANCE OF THE OH/HO2 REACTION YIELDING H2O/O2 [UNTERSUCHUNG DER REAKTION OH + HO2 YIELDS H2O + O2 MIT HILFE DER LASER-MAGNETISCHEN RESONANZ]
F. Temps and H. G. Wagner Sep. 1980 44 p refs In GERMAN
(MPIS-18A/1980; ISSN-0436-1199) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,60

The rate constants of the reactions OH + HO2 yields H2O + O2 and OH + H2O2 yields HO2 + H2O were measured at room temperature in an isothermal discharge flow reactor. The O-atoms and OH- or HO2-radicals were monitored with an optically pumped lmr-spectrometer. For the investigation of the second reaction, OH-radicals were produced by F+H2O yields OH+HF. The rate constant was found to be k sub 2 (296 K) = (1.05 + or - 0.20) time 10 to the 12th power cu cm/mol s. The rate constant of the first reaction was measured in three different kinetic systems using the HO2-sources, F+H2O2 yields HO2+HF or H+O2+M yields HO2+M and was found to be k sub 1 (296 K) = (3.9 + or - 1.5) x 10 to the 13th power cu cm/mol s. In the range 2 mbar < or - P < or - 14 mbar, k sub 1 is invariant with pressure. Author

N82-15162# National Standard Reference Data System. Molten Salts Data Center.
PHYSICAL PROPERTIES DATA COMPILATIONS RELEVANT TO ENERGY STORAGE. 4: MOLTON SALTS: DATA ON ADDITIONAL SINGLE AND MULTI-COMPONENT SALT SYSTEMS
G. J. Janz and R. P. T. Tomkins Jul. 1981 873 p refs Prepared in cooperation with Rensselaer Polytechnic Inst., Troy, N.Y.
(PB81-244121; NSRDS-NBS-61-Pt-4; LC-77-10824) Avail: NTIS HC A99/MF A01 CSCL 07D

Selected data are presented with value judgements for an additional set of 107 salt systems of interest as candidate materials for thermal energy storage sub-systems, for electrochemical energy storage systems, and in electrochemical aluminum production. The physical properties assessed are: melting points; phase diagrams; eutectic compositions; density; surface tension; viscosity; electrical conductivity; diffusion constants for ions; heat of fusion; heat capacity; volume change on fusion; vapor pressure; thermal conductivity (liquid and solid); and cryoscopic constant. The status of corrosion studies in the form of annotated bibliographic summaries, and salient observations on safety and hazards are also reported. A summarizing series of tables is provided as index to the data-gaps status for this set of candidate materials. GRA

N82-15163# National Bureau of Standards, Washington, D.C. Center for Analytical Chemistry.
THE MASS SPECTRA AND ISOTOPIC PURITY OF COMPOUNDS PROPOSED FOR USE IN THE MASTER ANALYTICAL SCHEME FOR THE ANALYSIS OF ORGANIC COMPOUNDS IN WATER
E. White, V. J. M. Welch, and H. S. Hertz Nov. 1980 62 p
(PB81-238453; NBSIR-80-2160) Avail: NTIS HC A04/MF A01 CSCL 07D

Mass spectra for 24 deuterated organic compounds are given in tabular and graphical form. The mole percent deuterium at labelled positions as determined by mass spectrometry for 23 compounds is given. GRA

N82-15164# National Bureau of Standards, Washington, D.C.
JOURNAL OF RESEARCH OF THE NATIONAL BUREAU OF STANDARDS. VOLUME 86, NO. 4, JULY - AUGUST 1981 Bimonthly Report, Jul. - Aug. 1981
1981 64 p
(PB81-247017; LC-63-37059) Avail: NTIS HC A04/MF A01 CSCL 07D

Contents: A method of calculating tunneling corrections for Eckart potential barriers; Generator columns and high pressure liquid chromatography for determining aqueous solubilities and octanol-water partition coefficients of hydrophobic substances; Enthalpies of solution of the nucleic acid bases. 6. Guanine in aqueous HCl and NaOH, and quanine hydrochlorides in aqueous HCl; Player aggregation in noncooperative games, II. Author

N82-15165# National Bureau of Standards, Washington, D.C. High Temperature Processes Group.
VAPORIZATION AND CHEMICAL TRANSPORT UNDER COAL GASIFICATION CONDITIONS
J. W. Hastie, D. W. Bonnell, E. R. Plante, and W. S. Horton Dec. 1980 114 p refs
(Contract DOE-EA-77-A-01-6010)
(PB81-245839; NBSIR-80-2178-DOE) Avail: NTIS HC A06/MF A01 CSCL 07D

Transpiration mass spectrometry for the quantitative analysis of high vapor temperature gases and vapors is described. This technique was applied to vapor transport and thermodynamic activity determinations for real and synthetic coal slag samples in reactive coal gas components at atmospheric pressure. A highly nonideal and nonmonotonic (with temperature and composition variables) behavior for alkali metal vapor transport was indicated. Thus a priori predictions of alkali metal transport in coal gasifiers without actual activity data are virtually impossible at the present time. Surface segregation and diffusion limitations of alkali species in slags are also possible complicating effects. Author

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N82-15166*# Iowa Univ., Iowa City. Div. of Materials Engineering.

EFFECTS OF MISALIGNMENT ON MECHANICAL BEHAVIOR OF METALS IN CREEP Final Report

Han C. Wu 20 Dec. 1981 14 p refs
(Grant NsG-1499)
(NASA-CR-165055; G302-81-003) Avail: NTIS HC A02/MF A01 CSCL 11F

Creep tests were conducted by means of a closed loop servocontrolled materials test system. The strain history prior to creep is carefully monitored. Tests were performed for aluminum alloy 6061-O at 150 C and were monitored by a PDP 11/04 minicomputer at a preset constant plastic strain rate prehistory. The results show that the plastic strain rate prior to creep plays a significant role in creep behavior. The endochronic theory of viscoplasticity was applied to describe the observed creep curves. Intrinsic time and strain rate sensitivity function concepts are employed and modified according to the present observation. S.L.

N82-15167*# Iowa Univ., Iowa City. Div. of Materials Engineering.

CREEP RECOVERY AND STRESS RELAXATION TESTS OF 6061-0 ALUMINUM

Han C. Wu and J. C. Yao 15 Dec. 1981 25 p refs
(Grant NsG-1499)
(NASA-CR-165056; G302-81-002) Avail: NTIS HC A02/MF A01 CSCL 11F

The investigation of creep recovery and stress relaxation in aluminum using a closed loop servo-hydraulic test system is described. The practicality of a computer controlled test system for constant plastic strain rate tension tests is demonstrated. The plastic strain rate and the magnitude of the initial strain are shown to have a noticeable effect on subsequent creep behavior of aluminum. J.D.H.

N82-15168# KHD Humboldt Wedag A.G., Cologne (West Germany). Haupabteilung Forschung und Entwicklung.

BAKING OF CARBON ANODES FOR THE ELECTROLYSIS OF ALUMINUM BY ELECTRIC RESISTANCE HEATING Final Report, Apr. 1980

Ernst Schultze-Rhonhof Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 41 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-168; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8,60

A distinct reduction of the energy input compared with the usual methods is possible when electric energy is substituted for fossil energy. Carbon anodes in a 1:1 scale can be baked uniformly by direct electric resistance heating. The characteristic chemical and physical data meets all requirements of the aluminum industry. The energy input has not yet come up to expectations. A.R.H.

N82-15169# Garrett Turbine Engine Co., Phoenix, Ariz.

HOT ISOSTATIC PRESSING OF ALUMINUM ALLOY CASTINGS Final Report, Oct. 1979 - Feb. 1981

S. J. Vonk, G. S. Hoppin, and K. W. Benn 15 Jun. 1981 64 p
(Contract N00019-79-C-0649)
(AD-A105562; Rept-31-3968) Avail: NTIS HC A04/MF A01 CSCL 11/6

The program documented in this final report was directed at identifying HIP parameters that would provide the greatest improvement in mechanical properties of A201 aluminum castings through closure of internal porosity. Author (GRA)

N82-15170# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

HIGH-TEMPERATURE FATIGUE LIFE OF TYPE 316 STAINLESS STEEL CONTAINING IRRADIATION INDUCED HELIUM

M. L. Grossbeck and K. C. Liu 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract W-7405-eng-26)
(DE81-028879; CONF-810831-28) Avail: NTIS HC A02/MF A01

Specimens of 20%-cold-worked AISI type 316 stainless steel were irradiated in the High Flux Isotope Reactor at 550 C to a maximum damage level of 15 dpa and a transmutation produced helium level of 820 at. ppM. Fully reversed strain controlled fatigue tests were performed in a vacuum at 550 C. No significant effect of the irradiation on low-cycle fatigue life was observed; however, the strain range of the 10 to the 7th power cycle endurance limit decreased from 0.35 to 0.30%. The relation between total strain range and number of cycles to failure was found to be Delta epsilon sub Tau = 0.02 Nu sub f(-06) for Nu sub f < 10 to the 7th power cycles. DOE

N82-15171# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

SWELLING, MICROSTRUCTURAL DEVELOPMENT AND HELIUM EFFECTS IN TYPE 316 STAINLESS STEEL IRRADIATED IN HFIR AND EBR-II

P. J. Maziasz and M. L. Grossbeck 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract W-7405-eng-26)
(DE81-028603; CONF-810831-29) Avail: NTIS HC A02/MF A01

The swelling and microstructural development of a single heat of 20 percent-cold-worked type 316 stainless steel irradiated to produce displacement damage and a high, continuous helium generation rate, in the High Flux Isotope Reactor (HFIR) are examined. Similar irradiation of the same heat of steel in the Experimental Breeder Reactor EBR-2 is used as a base line for comparing displacement damage accompanying a very low continuous helium generation rate. At temperatures above and below the void swelling regime approximately 350 C to 625 C swelling is greater in HFIR than in EBR-2. In the temperature range of 350 C to 625 C, cavity formation, precipitation and dislocation recovery are both enhanced and accelerated in HFIR. In HFIR cavities appear to be bubbles rather than voids and are smaller and more numerous than voids in EBR-2. Swelling becomes greater in EBR-2 than in HFIR for 20 percent-CW 316 in the void swelling temperature ranges as fluence increases. DOE

N82-15172# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

CORROSION OF TYPE 316 STAINLESS STEEL IN MOLTEN LiF-LiCl-LiBr

P. F. Tortorelli, J. H. DeVan, and J. R. Keiser 1981 11 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract W-7405-eng-26)
(DE81-028633; CONF-810831-27) Avail: NTIS HC A02/MF A01

The corrosion of type 316 stainless steel by flowing (about 15 mm/s) LiF-LiCl-LiBr salt at a maximum temperature of 535 C was studied to determine whether the salt is compatible with the structural material. The corrosion rate was found to be < 2 microns/year except immediately after the addition of a small amount of lithium metal to the salt. The lithium addition increased the corrosion rate to 13.5 microns/year at 535 C (approximately that of type 316 stainless steel exposed to lithium flowing at a similar velocity). At the proposed operating temperature it appears that type 316 stainless steel has acceptable compatibility with the tritium processing salt LiF-LiCl-LiBr for use with a fusion reactor lithium blanket. DOE

N82-15173# Oak Ridge National Lab., Tenn. Fossil Energy Program.

CORROSION OF HIGH-TEMPERATURE MATERIALS IN AFBC ENVIRONMENTS. PART 2: 4500-h TESTS

T. G. Godfrey and J. H. DeVan Aug. 1981 82 p refs
(Contract W-7405-eng-26)
(DE81-028024; ORNL/TM-7734/P2) Avail: NTIS HC A04/MF A01

Candidate heat exchanger tube materials were tested for times to 4500 h in a small atmospheric-pressure fluidized bed combustor (AFBC). The materials included alloy 800H; types 304, 310, and 316 stainless steel; and aluminized alloy 800H and type 310 stainless steel. These air-cooled tubes were exposed to the AFBC environment with wall temperatures ranging from 820 to 875 C, a Ca/S molar ratio of 3.3 to 5.3, 2.5 to 3.5 percent excess O2, and a fluidizing velocity of 0.7 m/s (2.3 fps). A set of low-temperature tubes also included in the test for the final 3000-h period, were composites of 2-1/4 Cr/1Mo steel and type 304 stainless steel and were air-cooled to temperatures in the range 480 C to 590 C. Tubes were given metallographic examination. Metal wastage was at the lower limit of detection and intergranular corrosion was not not severe. Most high-temperature samples contained subsurface specks of metal sulfides, primarily of manganese, extending to depths of about 50 micrometers. The position of the one affected tube in the bed may have been a more significant corrosion factor than the steel composition per se. DOE

N82-15174# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

PRECIPITATION AND CAVITY FORMATION IN AUSTENITIC STAINLESS STEELS DURING IRRADIATION

E. H. Lee, A. F. Rowcliffe, and L. K. Mansur 1981 6 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981

(Contract W-7405-eng-26)

(DE81-028062; CONF-810831-33) Avail: NTIS HC A02/MF A01

Microstructural evolution in austenitic stainless steels subjected to displacement damage at high temperature is strongly influenced by the interactions between helium atoms and second phase particles. Cavity nucleation occurs by the trapping of helium at partially coherent particle-matrix interfaces. The recent precipitate point defect collector theory describes the more rapid growth of precipitate-attached cavities compared to matrix cavities where the precitate-matrix interface collects point defects to augment the normal point deflect flux to the cavity.Data are presented which support these ideas. It is shown that during nickel ion irradiation of a titanium modified stainless steel at 675 C the rate of injection of helium has a strong effect on the total swelling and also on the nature and distribution of precipitate phases. DOE

N82-15175# Argonne National Lab., Ill.

COMPUTER SIMULATION OF BULK AND SURFACE CHEMICAL DIFFUSION OF LIGHT ATOMS IN METALS

1981 15 p refs Presented at the Symp. on Interatomic Potentials and Computer Simulation of Defects in Metals, Pittsburgh, 6-7 Oct. 1981

(Contract W-31-109-eng-38)

(DE81-025159; CONF-811019-1) Avail: NTIS HC A02/MF A01

The lattice gas as a model for interstitial solid solution and adsorption systems is reviewed with emphasis on the generation of ordered structures. Then, as a prelude to the main discourse on chemical diffusion, the tracer diffusion coefficient is discussed in conjunction with the presentation of Monte Carlo results. Chemical diffusion is treated in detail with emphasis on the Danken equation. Monte Carlo results are then presented for the chemical diffusion coefficient. The large maximum in the chemical diffusivity observed within the ordered phase is traced back to the very strong driving force provided by the chemical potential derivative. DOE

N82-15176# Battelle Pacific Northwest Labs., Richland, Wash.

SPUTTER DEPOSITION WITH NEARLY-PARALLEL COATING FLUX

J. W. Patten, E. D. McClanahan, R. W. Moss, and M. A. Bayne (Exxon Nuclear Co., Inc., Richland, Wash.) Apr. 1981 22 p refs

(Contract DE-AC06-76RL-01830)

(DE81-030107; PNL-SA-8969A) Avail: NTIS HC A02/MF A01

A method for producing a dense, nearly-parallel flux of sputtered atoms, that allows sputter depositing films having substantially 100% of theoretical density is described. The experimental sputtering chamber contains a target having a surface that is substantially parallel to the direction of the particles impinging upon the substrate surface, the distance between the most remote portion of the substrate surface receiving the particles and the target surface emitting the particles in a direction parallel to the substrate surface being relatively small. The pressure in the vessel is maintained less than about .65 Pa to limit scattering and permit line-of-sight deposition. Angles of incidence of the particles impinging upon the substrate surface do not vary greatly. Deposition rates are given as a function of distance from the target edge and distance from the target plane. Metallography of sputter deposited Ni is presented. DOE

N82-15177# Oak Ridge National Lab., Tenn.

RECENT RESULTS ON THE GETTERING OF TRITIUM FROM MOLTEN LITHIUM

J. B. Talbot, P. W. Fisher, and S. D. Clinton 1981 7 p refs Presented at the 2nd Topical Meeting on Fusion Reactor Mater., Seattle, 9-12 Aug. 1981 Submitted for publication

(Contract W-7405-eng-26)

(DE81-028214; CONF-810831-20) Avail: NTIS HC A02/MF A01

Recent sorption experiments confirm that the mass transfer resistance in the yttrium solid phase controls the rate of tritium uptake from liquid lithium. Physical and chemical characteristics of different yttrium sorbers were measured to identify those properties that have the greatest effect on the tritium recovery rate. The BET surface areas of the five samples tested ranged from 0.005 to 0.4 m(2)g; concentrations of carbon, hydrogen, nitrogen, and oxygen impurities in the sample lots increased with increasing surface area. The sample showing the highest effective sorption rate had the largest surface area but also contained the highest concentration of impurities. DOE

N82-15178# Brookhaven National Lab., Upton, N. Y. Div. of Metallurgy and Materials Science.

INTERACTION OF STRESS WITH THE MARTENSITIC PHASE TRANSITION IN A15 COMPOUNDS

David O. Welch 1981 10 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10 Aug. 1981

(Contract DE-AC02-76CH-00016)

(DE81-030527; BNL-30016; CONF-810835-26) Avail: NTIS HC A02/MF A01

The effect of the martensitic phase transition which occurs in many A15 compounds on superconductivity and on elastic and anelastic behavior is examined. Since in many practical applications, A15 compounds are subject to considerable stress and strain, it is of interest to examine the interaction of stress with the martensitic transition. An examination of the effects of stress predicted by a simple Landau model which successfully describes many features of the transition and the related temperature dependence of the elastic modulus (c11-c12)/2 was made. The effect of stress on the temperature ranges of stability and metastability of various types of martensitic domain and the nonlinearity of the stress-strain relation in a polycrystalline A15 are discussed. DOE

N82-15179# Northwestern Univ., Evanston, Ill. Dept. of Materials Science and Engineering.

SLIP SYSTEMS AND SOLID SOLUTION SOFTENING/HARDENING IN BCC METALS

M. Meshii 1981 9 p refs Presented at the US NSF and Japan Soc. for the Promotion of Sci. Seminar, Honolulu, Hawaii, Mar. 1981

(Contract DE-AS02-76ER-01367)

(DE81-028883; CONF-810391-1; COO-1367-121) Avail: NTIS HC A02/MF A01

The solid solution softening phenomenon is re-examined with special attention to intrinsic/extrinsic mechanism controversy. It appears that the existence of intrinsic solid solution softening is gaining support in many bcc metals. The existence however, is still questioned in Nb and Ta. In this report the recent observations supporting the intrinsic mechanism in Nb are reviewed. Solid solution hardening is observed in cases where the solvent metal deforms extensively by the coplanar double slip mode and softening in those which deform primarily by the single slip mode. DOE

N82-15180# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

PREIRRADIATION MICROSTRUCTURAL DEVELOPMENT DESIGNED TO MINIMIZE PROPERTIES DEGRADATION DURING IRRADIATION IN AUSTENITIC ALLOYS

P. J. Maziasz and T. K. Roche 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981

(Contract W-7405-eng-26)

(DE81-028612; CONF-810831-11) Avail: NTIS HC A02/MF A01

The first generation Prime Candidate Alloy (PCA) for the austenitic stainless steel class of alloys for application as a magnet fusion energy first wall material is a 14 Cr-16 Ni-0.25 Ti modification of Type 316 stainless steel. A key parameter for material performance is wall lifetime. The ability of the material to resist swelling and resist embrittlement during irradiation is important to longer wall lifetimes. The microstructure that evolves during irradiation is primarily responsible for both the swelling and embrittlement responses, and helium plays a central role in this microstructural evolution. This paper indicated how preirradiation microstructures that employ control of MC precipitation and dislocation density are designed and produced for fusion application of PCA. DOE

N82-15181# Hanford Engineering Development Lab., Richland, Wash.

NOTCH TENSILE BEHAVIOR OF IRRADIATED 20 PERCENT COLD-WORKED TYPE 316 STAINLESS STEEL

F. F. Huang and R. L. Fish Dec. 1980 22 p Presented at the Am. Nucl. Soc. Ann. Meeting, Miami Beach, 7-12 Jun. 1981

(Contract DE-AC14-76FF-02170)

(DE81-028170; HEDL-SA-2317; CONF-810606-95) Avail: NTIS HC A02/MF A01

Test results show that the notch sensitivity of 20% cold worked Type 316 stainless steel is dependent on irradiation temperature as well as test temperature. The temperature dependence becomes evident as the test temperature increases to 600C. At 232C, significant irradiation effects on the strength of 20% cold worked Type 316 stainless steel were observed. Irradiation hardening results from the introduction of various microstructural components which impede moving dislocations. For irradiation temperature < or = 500C, the strength of irradiated 20% cold worked Type 316 stainless steel increases with increasing fluence up to a fluence of about 4 x 10 cm sq. Little additional hardening occurs beyond this fluence. The notch sensitivity changes from a notch strengthening at lower fluences to a notch weakening at a fluence of 7.8 x 10 to the 22nd power n/cm sq. because of the inability of the material to relieve stress concentration around a notch. DOE

N82-15182# Ames Lab., Iowa. Dept. of Materials, Science and Engineering.

EFFECT OF APPLIED STRESS ON THE TRANSFORMATION BEHAVIOR OF Ni-Ti

C. H. Hsu and M. S. Wechsler 1981 5 p refs Presented at the ASM Intern. Conf. on Solid-Solid Phase Transformations, Pittsburgh, 10-14 Aug. 1981

(Contract W-7405-eng-82)

(DE81-029838; IS-M-338; CONF-810860-1) Avail: NTIS HC A02/MF A01

Measurements of axial strain, circumferential strain, and electrical resistivity were made on Ni-Ti tubes of approximate composition 55 wt percent nickel as a function of temperature cycling through the austenite-martensite transformation range. The tests were performed under various constant deadweight tensile loads. It was observed that the magnitudes of the transformation strain increased with increasing applied tensile stress. The results are interpreted in terms of crystallographic multiplicity of the martensite plates and the alteration of the martensite plate substructure in response to the applied stress. DOE

N82-15183# Pacific Northwest Lab., Richland, Wash.

RELATIVE EFFECTS OF S, Sb AND P ON THE INTERGRANULAR FRACTURE OF IRON AND NICKEL TESTED AT CATHODIC POTENTIALS

R. H. Jones, S. M. Bruemmer, M. T. Thomas, and D. R. Baer May 1981 5 p Presented at the NATO Advanced Study Inst. on Atomistics of France, Corsica, France, 22 May 1981

(Contract DE-AC06-76RL-01830)

(DE81-030076; PNL-SA-9446; CONF-810584-3) Avail: NTIS HC A02/MF A01

Evidence that S, Sb, and P participate in the embrittlement of iron and nickel tested at cathodic potentials by decreasing the critical intergranular fracture stress or by enhancing hydrogen permeation was examined. It is concluded that some elements may affect one or the other or possibly both processes. DOE

N82-15184# Union Carbide Corp., Oak Ridge, Tenn. Nuclear Div.

EFFECTS OF TENSILE DEFORMATION ON THE STRAIN MEMORY BEHAVIOR OF URANIUM-NIOBIUM ALPHA DOUBLE PRIME MARTENSITE

R. A. Vandermeer, D. A. Carpenter, W. G. Northcutt, Jr., and J. C. Ogle Aug. 1981 9 p refs Presented at the ASM Intern. Conf. on Solid-Solid Phase Transformations, Pittsburgh, 10-14 Aug. 1981

(Contract W-7405-eng-26)

(DE81-030285; Y/DV-134; CONF-810860-2) Avail: NTIS HC A02/MF A01

Tensile testing, dilatometry and X-ray diffraction techniques were used to characterize the effects of deformation on the strain memory behavior of alpha double prime martensite in a U + 14.63 at percent (6.25 wt percent) Nb alloy. The reversible strain limit in tension was determined to be 7 percent. The reversible deformation was accompanied by a reorientation of martensite. Certain favored orientations increased in volume fraction at the expense of less favored ones, suggesting that deformation occurred by the movement of intervariant interfaces and/or twin boundaries. When plastic deformation prevailed, a reversal in the reorientation mechanism resulted and the ensuring strain recovery was diminished in extent. The heat-activated strain reversal attained a maximum value of 4.2 percent and was associated with martensite reversion. Increasing amounts of deformation caused the strain recovery kinetics to be inhibited, resulting in a broader temperature range over which strain reversal was detected. DOE

N82-15185# California Univ., Berkeley. Lawrence Berkeley Lab.

ACTINIDES 1981

Sep. 1981 322 p refs Conf. held in Pacific Grove, Calif., 10-15 Sep. 1981

(Contract W-7405-eng-48)

(DE81-030350; LBL-12441; CONF-810948) Avail: NTIS HC A14/MF A01

Abstracts of 134 papers which were presented at the Actinides-1981 conference are presented. Approximately half of these papers deal with electronic structure of the actinides. Others deal with solid state chemistry, nuclear physics, thermodynamic properties, solution chemistry, and applied chemistry. DOE

N82-15186# California Univ., Livermore. Lawrence Livermore Lab.

PREDICTIVE CALCULATIONS OF VOLATILITIES OF METALS AND OXIDES IN STEAM CONTAINING ENVIRONMENTS

Oscar H. Krikorian 10 Aug. 1981 28 p refs Presented at the Conf. on Chem. of Mater. at High Temp., Harwell, Oxfordshire, 7-10 Sep. 1981

(Contract W-7405-eng-48)

(DE81-029638; UCRL-85553; CONF-810943-1) Avail: NTIS HC A03/MF A01

Predictive methods are developed for estimating the bond energies and free energy functions of volatile species having the general formula MO sub x (OH) sub y, in order to shed some light on the mechanisms and extent of steam accelerated volatilization processes. A specific example of applying the data is illustrated for the case of a proposed underground radioactive waste disposal process, where oxides of radionuclides are allowed to equilibrate with 100 atm steam and .01 atm oxygen at 1000 to 2000 K. Vapor species found to have high volatilities include C2(OH)2, CsOH, AmO2(OH)2, AmO(OH)3, UO2(OH)2, NbO(OH)3, PuO2(OH)2, CeO(OH)2, Ba(OH)2, and Eu(OH)3.

Thermodynamic data are tabulated for all possible monomeric species for this specific example. DOE

N82-15187# Pacific Northwest Lab., Richland, Wash.
PULSED-IRRADIATION CREEP IN NICKEL
E. P. Simonen and C. H. Henager, Jr. Jul. 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9-12 Aug. 1981
(Contract DE-AC06-76RL-01830)
(DE81-030078; PNL-SA-9266; CONF-810831-53) Avail: NTIS HC A02/MF A01

Results from a series of pulsed irradiation creep tests have indicated a significant effect of beam heating on pulsed irradiation creep behavior. A pulsing effect due to intermittent atomic displacement damage was not observed. Sheet metal specimens were irradiated at 473 K using 15 MeV deuterons and a stress of 200 MPa. The pulse cycle consisted of 1000 seconds of irradiation followed by 100 seconds of annealing. Pulsed irradiation creep behavior was compared with steady irradiation creep behavior. The experimental results were interpreted using models of intermittent displacement damage and theories of temperature history effects. DOE

N82-15188# Los Alamos Scientific Lab., N. Mex.
EFFECT OF CYCLIC PULSED TEMPERATURE ON VOID GROWTH IN METALS DURING IRRADIATION
L. N. Kmetyk, W. F. Sommer, and J. Weertman 1981 7 p refs Presented at the 2nd Fusion Reactor Mater. Meeting, Seattle, 9-12 Aug. 1981
(Contract W-7405-eng-36)
(DE81-030112; LA-UR-81-2437; CONF-810831-55) Avail: NTIS HC A02/MF A01

Analysis on radiation-produced point defect transport to lattice sinks and analysis of pulsed radiation have been extended to include the effects of radiation-induced temperature oscillations. These temperature pulses enhance void growth if the ambient temperature is below the peak swelling temperature and, conversely, decrease void growth when the ambient temperature is above the peak swelling temperature. When the temperature pulses were supposed, no difference was seen between void growth under steady and pulsed irradiation. The same effects on void growth can be obtained by superposing externally-produced temperature pulses on material under steady irradiation. Calculations were done for aluminum and molybdenum for sinusoidal temperature pulses of many amplitudes and frequencies. DOE

N82-15189# Hanford Engineering Development Lab., Richland, Wash.
DAMAGE DEVELOPMENT AND HARDENING IN 14 MeV NEUTRON IRRADIATION OF COPPER ALLOYS AT 25 DEG C
H. R. Brager, F. A. Garner, and N. F. Panayotou Jul. 1981 6 p refs Presented at Second Topical Meeting Fusion Reactors Mater., Seattle, 9-12 Aug. 1981
(Contract DE-AC14-76FF-02170)
(DE81-029780; HEDL-SA-2357; CONF-810831-44) Avail: NTIS HC A02/MF A01

Copper and copper alloyed with five atom percent of either aluminum, nickel or manganese were irradiated at 25 C with 14 MeV neutrons to fluences up to 7.5 x 10 to the 17th power n/sq cm (0.003 dpa). The radiation-induced microstructure of these materials was characterized by the coupled use of electron microscopy and microhardness. The irradiation-induced microhardness changes were found to be independent of alloy identity and the magnitude of the solute-induced hardening. It appears that at least 70 percent of the defect clusters are smaller than resolvable by microscopy (approximately 1 nm). The point defects at 25 C which survive recombination and aggregate in either visible or invisible clusters constitute at least 8 percent of those produced in the cascades. DOE

N82-15190# Hanford Engineering Development Lab., Richland, Wash.
EFFECTS OF TRANSMUTATION PRODUCTS ON SWELLING IN 316 STAINLESS STEEL
J. F. Bates, F. A. Garner, and F. M. Mann 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9-12 Aug. 1981
(Contract DE-AC14-76FF-02170)
(DE81-029805; HEDL-SA-2342-FP; CONF-810831-47) Avail: NTIS HC A02/MF A01

Application of the extensive data base developed in fission reactors to the design of fusion reactors requires an understanding of the differences in the characteristics of the two neutron spectra. Results of a study in which the isotopic evolution of AISI 316 was calculated for two breeder reactors, two fusion devices, and the High Flux Isotope Reactor (HFIR) are presented. The largest changes in composition arise in HFIR, where the manganese is strongly depleted and substantial vanadium is generated. Both of these elements increase in fusion reactors but much more slowly. Data on the swellings of AISI 316 is presented to show that depletion of manganese in HFIR will lead to changes in the swelling behavior. Swelling behavior may be altered by vanadium in a manner typical of other strong MC-carbide forming elements such as titanium. DOE

N82-15191# Hanford Engineering Development Lab., Richland, Wash.
SWELLING OF SEVERAL COMMERCIAL ALLOYS FOLLOWING HIGH FLUENCE NEUTRON IRRADIATION
R. W. Powell, D. T. Peterson, M. K. Zimmerschied, and J. F. Bates Jan. 1981 6 p refs Presented at the 2nd Topical Meeting on Fusion Reactor Mater., Seattle, 9-12 Aug. 1981
(Contract DE-AC14-76FF-02170)
(DE81-029804; HEDL-SA-2341; CONF-810831-48) Avail: NTIS HC A02/MF A01

Swelling values for a set of commercial alloys irradiated over the temperature range of 400 to 650 C. The alloys studied fall into three classes: the ferritic alloys AISI 430 F, AISI 416, EM-12, H-11 and 2 1/4 Cr-1 Mo; the superalloys Inconel 718 and Inconel X-750; and the refractory alloys TZM and Nb-1 Zr. After irradiation to a peak fluence approaching goal exposures envisioned for advanced fusion reactor first walls, all of the alloys display swelling resistance far superior to cold worked AISI 316. Of the three alloy classes examined the swelling resistance of the ferritics is the least sensitive to composition. DOE

N82-15192# Hanford Engineering Development Lab., Richland, Wash.
MICROSTRUCTURAL EXAMINATION OF SEVERAL COMMERCIAL FERRITIC ALLOYS IRRADIATED TO HIGH FLUENCE
D. S. Gelles 1981 6 p refs Presented at the 2nd Topical Meeting on Fusion Reactor Mater., Seattle, 9-12 Aug. 1981
(Contract DE-AC14-76FF-02170)
(DE81-029800; HEDL-SA-2338-FP; CONF-810831-45) Avail: NTIS HC A02/MF A01

Microstructural observations are reported for a series of five commercial ferritic alloys, 2 1/4 Cr-1 Mo, H-11, EM-12, 416, and 430F, covering the composition range 2.25 to 17% chromium, following EBR-II irradiation over the temperature range 400C to 650C and to a maximum fluence of 17.6 x 10 to the 22nd power n/sq cm E > 0.1 MeV). These materials were confirmed to be low void swelling with maximum swelling of 0.63% measured in EM-12 following irradiation at 400C to 14.0 x 10 to the 22nd power n/sq cm. A wide range of precipitation response was found both as a function of alloy and irradiation temperature. Precipitates observed included M6C, Mo2C, Chi, Laves, M23C6, Alpha and a low temperature phase as yet unidentified. It is predicted, based on these results, that the major impact of irradiation on the ferritic alloy class will be changes in postirradiation mechanical properties due to precipitation. DOE

N82-15193# Kraftwerk Union A.G., Mulheim (West Germany). Arbeitsgemeinschaft Waermebehandlung und Werkstofftechnik.
REQUIREMENTS FOR HEAT RESISTANT AND HIGHLY HEAT RESISTANT MATERIALS IN THE CONSTRUCTION OF STATIONARY TURBINES [ANFORDERUNGEN AN WARMFESTE UND HOCHWARMFESTE WERKSTOFFE IM STATIONAEREN TURBINENBAU]
B. Deblon 1980 28 p refs In GERMAN Presented at Status-Sem. on Waermebehandlung warmfester u. hochwarmfester Werkstoffe, Schloss Dachau, West Germany, 12-13 Jun. 1980

Avail: NTIS HC A03/MF A01

The requirements for the characteristics of construction materials for turbines are discussed as regards design and cost estimates in order to cope with the demand for higher power and efficiency in the field of electric energy production. This demand entails larger dimensions and higher pressure and temperature at the turbine entrance. The material requirements for blades, rotor parts, housing, and components in contact with hot vapor and hot gas are deduced. It is impossible to fulfill all requirements at the same time. Optimization stresses the important material characteristics, bearing in mind that results on small workpieces are not necessarily transferable to larger ones. Author (ESA)

N82-15194# SEP Gesellschaft fuer Technische Studien, Entwicklung, Planung m.b.H., Munich (West Germany).

DEVELOPMENT AND TESTING OF A LOW WASTE NICKEL PLATING PROCESS Final Report, Jun. 1980

Rainer Huss Bonn Bundesministerium fuer Forschung und Technology Feb. 1981 90 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-046; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18,90

The economic feasibility of a nickel electroplating process was investigated. This supplementary unit was connected to an existing automatic nickel-chrome plating line. Test results prove the functioning of the process and show comprehensive reductions in waste (sludge disposal, waste water) as well as savings in nickel (recovery), chemicals, and water. According to a profit calculation investment system is recovered in two to three years. Author (ESA)

N82-15195# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Reaktorwerkstoffe.

QUANTITATIVE STRUCTURAL ANALYSIS OF CHROMATICALLY CONTRASTED REFRACTORY ALLOYS

H. J. Blumenkamp, E. Wallura, H. Hoven, K. Koizlik, and H. Nickel Aug. 1980 80 p refs In GERMAN; ENGLISH summary Original contains color illustrations

(Juel-1673; ISSN-0366-0885) Avail: NTIS HC A05/MF A01

A chromatic contrasting technique, using gas ion etching, was introduced for metallography of refractory alloys to improve quantitative metallography. Refractory alloys, such as iron and nickel alloys were subjected to long-term creep tests and corrosion experiments. Phase discrimation in the chromatically contrasted alloys is increased by using monochromatic light for visual examination and the application of quantitative image analysis to these materials is made possible. Author (ESA)

N82-15764# Joint Publications Research Service, Arlington, Va.

MICROBIOLOGIC ASPECTS OF METAL CORROSION

Ye. I. Andreyuk and I. A. Kozlova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 1-9 refs Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 139-145 (For primary document see N82-15763 06-51)

Avail: Issuing Activity

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N82-15196*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Materials Engineering.

ION BEAM SURFACE MODIFICATION

David W. Dwight [1982] 5 p

(Grant NsG-3204)

(NASA-CR-165062) Avail: NTIS HC A02/MF A01 CSCL 07C

The essential details of a study on the practical applications and mechanisms of polymer sputtering via Argon ion impact are summarized. The potential to modify the properties of polymer surfaces to improve their adherence, durability, biocompatibility, or other desirable properties by ion beam sputtering was emphasized. Ion beam milling can be of benefit as an analytical tool to obtain composition versus depth information. Ion impact from a directed ion gun source specifically etches polymer structures according to their morphologies, therefore this technique may be useful to study unknown or new morphological features. Factors addressed were related to: (1) the texture that arises on a polymer target after ion impact; (2) the chemistry of the top surface after ion impact; (3) the chemistry of sputtered films of polymeric material deposited on substrates placed adjacent to targets during ion impact; and (4) practical properties of textured polymer targets, specifically the wettability and adhesive bonding properties. M.D.K.

N82-15197*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

NITRIDATION OF SILICON M.S. Thesis Case Western Reserve Univ.

Nancy J. Shaw Oct. 1981 113 p refs

(NASA-TM-82722, E-921) Avail: NTIS HC A06/MF A01 CSCL 11G

Silicon powders with three levels of impurities, principally Fe, were sintered in He or H2. Non-densifying mechanisms of material transport were dominant in all cases. High purity Si showed coarsening in He while particle growth was suppressed in H2. Lower purity powder coarsened in both He and H2. The same three Si powders and Si /111/ single crystal wafers were nitrided in both N2 and N2/H2 atmospheres. Hydrogen increased the degree of nitridation of all three powders and the alpha/beta ratio of the lower purity powder. Some Si_3N_4 whiskers and open channels through the surface nitride layer were observed in the presence of Fe, correlating with the nitridation-enhancing effects of Fe. Thermodynamic calculations showed that when SiO_2 is present on the Si, addition of H2 to the nitriding atmosphere decreases the amount of SiO_2 and increases the partial pressure of Si-containing vapor species, that is, Si and SiO. Large amounts of NH_3 and SiH_4 were also predicted to form. R.J.F.

N82-15198*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

GEOMETRICAL ASPECTS OF THE TRIBOLOGICAL PROPERTIES OF GRAPHITE FIBER REINFORCED POLYMIDE COMPOSITES

Robert L. Fusaro 1982 36 p refs Presented at the Ann. Meeting of the Am. Soc. of Lubrication Engrs., Cincinnati, 10-13 May 1982

(NASA-TM-82757; E-1076) Avail: NTIS HC A03/MF A01 CSCL 11D

A latin square statistical experimental test design was used to evaluate the effect of temperature, load and sliding speed on the tribological properties of graphite fiber reinforced polymide (GFRPI) composite specimens. Hemispherically tipped composite riders were slid against 440 C HT stainless steel disks. comparisons were made to previous studies in which hemispherically tipped 440 C HT stainless steel riders were slid against GFRPI composite disks and to studies in which GFRPI was used as a liner in plain spherical bearings. The results indicate that sliding surface geometry is especially important, in that different geometries can give completely different friction and wear results. Load, temperature, and sliding distance were found to influence the friction and wear results but sliding speed was found to have little effect. Experiments on GFRPI riders with 10 weight percent additions of graphite fluoride showed that this addition has no effect on friction and wear. Author

N82-15199*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

ELUCIDATION OF WEAR MECHANISMS BY FERROGRAPHIC ANALYSIS

William R. Jones, Jr. 1981 18 p refs Presented at the Tech. Symp. on Water Glycol Hydraulic Fluids at BASF Wyandotte Corp., Wyandotte, Mich., 8 Oct. 1981

(NASA-TM-82737; E-1050) Avail: NTIS HC A02/MF A01 CSCL 20K

The use of ferrographic analysis in conjunction with light and scanning electron microscopy is described for the elucidation

of wear mechanisms taking place in operating equipment. Example of adhesive wear, abrasive wear, corrosive wear, rolling element fatigue, lubricant breakdown, and other wear modes are illustrated. In addition, the use of magnetic solutions to precipitate nonmagnetic debris from aqueous and nonaqueous fluids is described. Author

N82-15200# Siemans A.G., Neustadt b. Coburg (West Germany). Bereich Starkstromkabel und -Leitungen.

CROSSLINKING OF POLYOLEFIN INSULATION OF CABLES AND INSULATED WIRES BY THE USE OF ENERGY-RICH RADIATION. PART 1: MATERIAL OF IRRADIATION Final Report, Mar. 1980

Detlef Pieper and Arnold Schillmoeller Bonn Bundesminesterium fuer Forschung und Technologie Jul. 1981 173 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-122-Vol-1; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 31,80

Polyolefins were selected that are crosslinkable by radiation including the copolymers of ethylene and polyolefin elastomer blends. Effective stabilizing systems against thermo-oxidative ageing and copper-catalized oxidation were developed. The influence of crosslink-reforcing, coagents fillers, and pigments was studied. For the materials XLPE, EPR and EVA the optimization of compounds in a scope of production trials resulted in useful proposals for solutions for 1kV insulating compounds. T.M.

N82-15201# Siemens A.G., Erlangen (West Germany).

CROSSLINKING OF POLYOLEFIN INSULATIONS OF CABLES AND INSULATED WIRES BY THE USE OF ENERGY-RICH RADIATION. PART 2: PHYSICS OF ELECTRON BEAM IRRADIATION OF CABLES AND WIRES Final Report, Mar. 1980

Rudolf Baeuerlein Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 94 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-123-Vol-2; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19,70

Physical quantities having an important effect on the electron beam radiation of plastic are dealt with and in some cases measurements are given. Major criteria for the setting up of an electron beam irradiation device, e.g. beam voltage, beam power and method of imparting the radiation, are presented and discussed with reference to the radiation crosslinking of lkV cable insulation core. These irradiation parameters were calculated with the aid of a computer program and compared with the test results. For programming purposes, experiments were conducted to ascertain the necessary current density distribution at the wire handling level. To check the computer results, the radiation dose was ascertained with the aid of the Young's modulus of a crosslinked high polymer in a rubber-elastic state. T.M.

N82-15202# Siemans A.G., Neustadt b. Coburg (West Germany). Bereich Starkstromkabel und -Leitungen.

CROSSLINKING OF POLYOLEFIN INSULATIONS OF CABLES AND INSULATED WIRES BY THE USE OF ENERGY-RICH RADIATION. PART 3: PRODUCTION ENGINEERING Final Report, Mar. 1980

Hans-Dieter Bickel, Hans Heublein, and Dietmar Weber Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 224 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-124-Vol-3; ISSN-0340-7608) Avail: NTIS HC A10/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 38,90

Crosslinking of the PE insulations of electrical conductors by means of electron beams represents a perfect alternative to existing thermic and chemical procedures. From projecting-up to running-in of the plant there were no difficulties of general nature. For an essential range of products the most important production parameters could be determined. Some problems occuring during the radiation of products, such as straightening of the conductor, non-performance of the exactly specified adhesion power of the insulation to the conductor and non-uniform thickness of insulation could be eliminated by an optimization of the concerned parts of the plant. With the exception of three greater repairs within 4 years, up to now no defects were to be observed in the radiation plant. Heavy corrosion in the radiation part by ozone and nitrogen oxides in the beginning was reduced to an acceptable degree by suitable measures. A.R.H.

N82-15203# Schaefer (Fritz) G.m.b.H., Neunkirchen (West Germany).

RECYCLING PLANT FOR PAINT SLUDGES Final Report, Dec. 1980

Karl-Heinz Berewinkel Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 85 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-125; ISSN-0340-7608) Avail: NTIS HC A05/MF a01; Fachinformationszentrum, Karlsruhe, West Germany DM 17,85

The efficiency of paint spraying is, according to present technology, not satisfactory because the percentage of overspraying is too big. A pilot plant demonstrated that the amount of overspray can be reduced and the paint sludge can be recycled, resulting in considerable savings. L.F.M.

N82-15204# Sandia Labs., Albuquerque, N. Mex.

LOW PRESSURE HUGONIOT CUSP IN POLYMERIC MATERIALS

S. A. Sheffield and D. D. Bloomquist 1981 5 p refs Presented at the APS Conf. on Shock Waves in Condensed Matter, Menlo Park, Calif., 23 Jun. 1981

(Contract DE-AC04-76DP-00789)

(DE81-028267; SAND-81-0052C; CONF-810684-46) Avail: NTIS HC A02/MF A01

Polymethyl methacrylate (PMMA) exhibits a cusp in the shock Hugoniot at about 2.0 GPa which corresponds with the beginning of shock induced polarization and the begining of an exothermic studies. Other polymers have similar behavior at about the same pressure. Quartz guage impact experiments were performed using polypyromellitimide (Vespel) and polysulfone impactors to obtain Hugoniot information and the stress history at the impact plane. In the case of Vespel a slight Hugoniot cusp was observed at about 1.8 GPa which coincides with the start of shock induced polarization. Polysulfone does not appear to have a cusp but does show stress relaxation at the impact plant beginning at about 1.8 GPa, again coinciding with the start of shock induced polarization. The abnormal behavior in PMMA is the result of a shock induced chemical reaction. A stress of about 2 GPa is a threshold for shock induced chemical reaction in several polymers. DOE

N82-15205# Oak Ridge National Lab., Tenn. Solid State Div.

MECHANICAL STRENGTH OF LOW-TEMPERATURE-IRRADIATED POLYIMIDES: A FIVE-TO-TENFOLD IMPROVEMENT IN DOSE RESISTANCE OVER EPOXIES

R. R. Coltman, Jr. and C. E. Klabunde Jun. 1981 6 p refs Presented at the 2nd Topical Meeting on Fusion Reactor Mater., Seattle, 9-12 Aug. 1981 Submitted for publication

(Contract W-7405-eng-26)

(DE81-025469; CONF-810831-15) Avail: NTIS HC A02/MF A01

Neutronics calculations by Engholm show that without additional shielding even the first-fusion test reactors such as the Fusion Engineering Device will produce lifetime doses at magnet insulator locations that exceed the radiation tolerance of glass-fabric-filled (gff) epoxies now used. To explore the possible use of an alternative insulator, the mechanical strength of pure and recently available gff polyimides was studied as a function of gamma-ray irradiation at 4.9 K to 100 MGy 10 to the 10th power. After a postirradiation anneal at 307 K the flexure and compressive strengths of the gff materials measured at 77K were reduced by up to 40 percent for 100 MGy while the pure material changed little. Testing done at 300 K gave similar results, but all stress values were about 40 percent less. Compared to earlier epoxy studies we find that, overall, the gff polyimides are 5 to 10 times more radiation resistant than comparably prepared gff epoxies. DOE

N82-15206# Sandia Labs., Albuquerque, N. Mex. Surface Metallurgy Div.

THIN FILM ADHESION AND DEADHESION

D. M. Mattox 1981 8 p refs Presented at the Intern. Soc. for Hybrid Microelectron. Meeting, Chicago, 12 Oct. 1981

(Contract DE-AC04-76DP-00789)

(DE81-028415; SAND-81-0590C; CONF-811029-1) Avail: NTIS HC A02/MF A01

Adhesion is a microscopic property of a system and the failure of adhesion or deadhesion involves failure of large areas of material the surfaces of which rarely separate at a sharp boundary between two materials. Good adhesion is prompted by: (1) strong bonding in the interfacial region; (2) absence of high stresses; (3) absence of easy fracture modes; and (4) no long-term degradation modes. Each of these factors may be influenced by the materials involved, the deposition method used, the deposition parameters and the services/test conditions. A number of these factors which determine the adhesion of film-substrate systems are reviewed and attempts to outline some methods for resolving adhesion problems are outlined. DOE

N82-15207# Sandia Labs., Albuquerque, N. Mex.

TOUGHENING IN GLASS CERAMICS THROUGH MICROSTRUCTURAL DESIGN

J. J. Mecholsky 1981 16 p refs Presented at the Intern. Symp. on the Fracture Mech. of Ceramics, University Park, Pa., 15 Jul. 1981

(Contract DE-AC04-76DP-00789)

(DE81-030209; SAND-81-0064C; CONF-810746-2) Avail: NTIS HC A02/MF A01

Pertinent literature was reviewed to establish the effect of several material parameters on fracture toughness, K sub IC, of glass ceramics. Important parameters considered included phase separation in glass, size, shape and quantity of the crystalline phase, and internal stress. By applying toughening mechanisms established for ceramic materials to glass ceramic systems, techniques for toughening glass ceramics are developed. Phase separation, internal stress, morphological interaction, stress induced phase transformation, and combinations of these techniques were considered. DOE

N82-15208# Sandia Labs., Albuquerque, N. Mex.

ELECTRICAL CONDUCTIVITY AND THERMAL DECOMPOSITION OF HIGH TEMPERATURE PHENOLIC- AND SILICONE-BASED MATERIALS

R. T. Johnson, Jr. and R. M. Biefeld 1981 22 p refs Presented at the Conf. on Elec. Insulation and Dielec. Phenomena, Whitehaven, Pa., 25 Oct. 1981

(Contract DE-AC04-76DP-00789)

(DE81-023177; SAND-81-0786C; CONF-811016-1) Avail: NTIS HC A02/MF A01

The temperature dependence of the electrical conductivity and thermal decomposition characteristics of several phenolic and silicone resins reinforced with glass chopped fabric or cloth were measured to 600C to 700C in a nitrogen atmosphere. The electrical results were correlated with mass loss and thermal decomposition product data obtained using mass spectroscopy and thermal gravimetric analysis. Peaks in the conductivity temperature dependence and deviations from ohmic behavior were found to be associated with material decomposition and/or outgassing. Results show a direct correlation between thermal stability and temperature dependent electrical characteristics. DOE

N82-15209# Sandia Labs., Albuquerque, N. Mex.

EFFECTS OF ION IMPLANTATION ON THE PHOTOFERROELECTRIC PROPERTIES OF LEAD LANTHANUM ZIRCONATE TITANATE CERAMICS

C. E. Land and P. S. Peercy 1981 4 p refs Presented at the 5th Intern. Meeting on Ferroelectricity, University Park, Pa., 17 Aug. 1981 and at the 4th Symp. on Ferroelectric Semiconductors, Rostov-on-Don, USSR, 4 Jun. 1981 Sponsored in part by Army

(Contract DE-AC04-76DP-00789)

(DE81-028386; SAND-81-1834C; CONF-810863-1) Avail: NTIS HC A02/MF A01

Investigations of the implantation of chemically active ions, e.g., Al and Cr, in ferroelectric phase lead lanthanum zirconate titanate (PLZT) ceramics indicate that the absorption spectrum of the implanted region can be extended from the near ultraviolet to the visible, and that the extrinsic (visible light) photoferroelectric sensitivity can be improved substantially with respect to that of PLZT implanted with inert ions. The results of these studies are reviewed and photographic sensitivities of Ar-, Ar + Ne-, Ar + Ne + He-, Al-, Cr-, Fe-, and Fe + Ne- implanted PLZT at both near-uv and visible light wavelengths are compared with the sensitivities of other image storage media. DOE

N82-15210# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

US CERAMIC HEAT EXCHANGER TECHNOLOGY: STATUS AND OPPORTUNITIES

V. J. Tennery 1981 5 p Presented at the Conf. on Advancement in Heat Exchangers, Dubrovnik, Yugoslavia, 7 Sep. 1981

(Contract W-7405-eng-26)

(DE81-029686; CONF-810946-1) Avail: NTIS HC A02/MF A01

The status of ceramic heat exchanger technology in the United States is reviewed including the basis for interest in designing, building, and demonstrating these components for application in energy systems. Ceramic heat exchangers for waste heat recovery and for advanced energy systems are discussed. DOE

N82-15211# Technische Hochschule, Aachen (West Germany). Inst. fuer Kunststoffverarbeitung.

CROSSLINKING OF POLYETHYLENE IN VIEW OF AN APPLICATION IN WIRE COATING Final Report, Dec. 1979

Bernd Franzkoch and Karl Beiss Bonn Bundesministerium fuer Forschung und Technologie Apr. 1981 261 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-058; ISSN-0340-7608) Avail: NTIS HC A12/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 42.60

Different polyethylene crosslinking methods to improve the characteristics of the material as wire coating were tested. It was determined that polyethylene curing by UV radiation is not suitable for application in wire coating. At higher insulation thickness, too much radiation is absorbed to cure deeper layers of the insulation. Using a shear gap die, melt temperatures can be raised within a very short time to a level high enough to initiate peroxide decay, thus starting the crosslinking reaction. Application of microwaves and use of special microwave-sensitive peroxides is recommended. These peroxides have to be polar to absorb energy from the alternating field. The energy splits the peroxy group of the molecule, thus generating radicals, and the crosslinking reaction takes place. Author (ESA)

N82-15212# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.

THERMOMECHANICAL DYNAMIC ANALYSIS OF A PREPREG: APPLICATIONS TO INDUSTRIAL BAKING [ANALYSE THERMOMECANIQUE DYNAMIQUE D'UN PREIMPREGNE APPLICATIONS AUX CUISSONS INDUSTRIELLES]

J. Hognat 8 Sep. 1980 13 p In FRENCH Presented at 4th Natl. and 1st Intern. Meeting on Composite Mater., Milan, 19-21 Nov. 1980

(SNIAS-812-551-105; C.41-629) Avail: NTIS HC A02/MF A01

The rheological characteristics of the resin used in the fabrication of a polymer matrix composite were studied. The fabrication of an organic matrix composite supposes both a thermal cycle for the polymerization of the resin and compacting pressure on the stack of prepregs at a point in the thermal cycle where the viscosity of the resin is adequate for good fiber/resin contact, obtaining a composite without porosity that has high mechanical strength. Composite sheets were produced, applying compacting pressure at different characteristic stages in the resin gelation process. Structural porosity is assessed and optimal temperature and baking time are determined. Author (ESA)

N82-15213# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.

CHARACTERIZATION OF THE POLYMERIZATION OF AN

IMPREGNATION RESIN: APPLICATION TO INDUSTRIAL BAKING [AUTOPSIE DE LA POLYMERISATION D'UNE RESINE D'IMPREGNATION. APPLICATIONS AUX CUISSONS INDUSTRIELLES]

Jacques Hognat and A. Dartus 28 Apr. 1980 12 p In FRENCH Presented at 3rd Intern. Conf. on Materiaux Composites et 2nd Journees Natl. sur les Composites, Paris, 26-29 Aug. 1980
(SNIAS-812-551-107; C.41247) Avail: NTIS HC A02/MF A01

Thermomechanical, physicochemical, and electrical tests were conducted to study their adequacy, with a given thermal cycle, to follow matrix polymerization and to determine the zone of gelation initiation favorable as a pressure point on a prepreg stack to obtain the best composite possible. Composite sheets were fabricated with pressure applied at varying stages in the thermal cycle and structural porosity was assessed. It is concluded that the thermomechanical technique is prefered for industrial purposes because of its greater simplicity in application.
Author (ESA)

N82-15214# Bureau of Mines, Tuscaloosa, Ala.

EFFECT OF ADDITIVES ON SINTERING OF SILICON NITRIDE-ALUMINA-ALUMINUM NITRIDE COMPOSITIONS

B. W. Jong (Bureau of Mines, Boulder City, Nevada) and H. Heystek Jun. 1981 20 p refs
(PB81-231086; BM-RI-8546) Avail: NTIS HC A02/MF A01 CSCL 11B

The effect of additives and starting materials on the sintering and strength properties of sialon (silicon-aluminium-oxynitride) compositions fabricated by conventional pressing and sintering techniques are evaluated. Sintering and modulus of rupture (MOR) data were developed for sialon compositions produced from three components, Si3N4, Al2O3, and AlN. When doped with Y2O3 to aid in sintering, the highest MOR values were obtained with compositions containing between 20 and 30 mole pct (Al2O3 + AlN). GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion.*

N82-15215# Staatliches Forschungsinstitut fuer Geochemie, Bamberg (West Germany).

TRACER INVESTIGATIONS OF THE LAWS GOVERNING THE MIGRATION OF PHLEGMATIZERS IN GUN PROPELLANTS [TRACERUNTERSUCHUNGEN UEBER GESETZMAESSIGKEITEN DER PHLEGMATISATORMIGATION IN TREIBLADUNGSPULVERN]

H. Meier, D. Boesche, G. Zeitler, E. Zimmerhackl, W. Hecker, and U. Tschirwitz Bonn Bundesministerium der Vertetdigung 1981 89 p refs In GERMAN; ENGLISH summary
(BMVg-FBWT-81-7) Avail: NTIS HC A05/MF A01; DOKZENTBw, Bonn DM 30

The penetration behavior of various phlegmatizer/solvent systems in nitrocellulose propellant grains was measured by applying the radiotracer technique. The tracer methods used for these measurements of the distribution of phlegmatizers such as di-iso-octylphthalate, di-n-nonylphthalate and di-iso-nonylphthalate labelled with carbon-14 are based on the profile sectioning technique in conjuction with liquid scintillation counting and autoradiography. The measurements yield the values for diffusion coefficients, activation energies and frequency factors.
T.M.

N82-15216# Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 2.

ACCELERATED AGING OF HTPB-BASED COMPOSITE PROPELLANTS AND LINERS

Bengt Nilsson and Roland Sanden Apr. 1981 21 p refs In SWEDISH; ENGLISH summary
(FOA-C-20405-D1) Avail: NTIS HC A02/MF A01

Samples of rocket propellants based on HTPB of the type R-45HT were stored in closed pots at temperatures of 20, 40, 60 and 80 C for two to three years. Two types of antioxidants, PBN and BKF, were tested. One of the propellants contained 1 percent Fe2O3. Tensile and hardness tests were performed at different times. All the propellants show excellent aging properties. Some HTPB-based liner materials were tested. Samples were stored for long times at room temperature and at 70 C and were tested in respect to mechanical properties and adhesion to steel plates. The results indicate excellent aging properties also for these materials. T.M.

N82-15217# Research Inst. of National Defence, Stockholm (Sweden). Huvudavdelning 2.

DEVELOPMENT OF A SOLID PROPELLANT WITH A HIGH LEVEL FUEL CONTENT FOR VOLVO ROCKET ENGINE AB(VFA) [UTVECKLING AV EN KRUTLADDNING MED ETT BRAENSLERIKT KRUT AAT VOLVO FLYGMOTOR]

Torsten Liljegren and Bert Anderson Sep. 1981 23 p ref In SWEDISH; ENGLISH summary
(FOA-C-20421-D3) Avail: NTIS HC A02/MF A01

The propellant contains 40% ammonium perchlorate and 1.5% iron oxide (Fe2O3) as the burning catalyst. The fuel is a mixture of hydroxy terminated polybutadiene and polystyrene in the ratio 1:1. The charge, which is tubular, is case-bonded and the ends are not inhibited. The charge configuration gives a nearly constant pressure-time curve and the desired performance: mass flow 0.130 kg/s and burning time 12 s. T.M.

N82-15218# Battelle Pacific Northwest Labs., Richland, Wash.

FUEL-PERFORMANCE-IMPROVEMENT PROGRAM Semi-annual Progress Report, Oct. 1980 - Mar. 1981

C. E. Crouthamel Apr. 1981 75 p refs Prepared in cooperation with Exxon Nuclear Co., Inc., Richland, Wash. and Consumers Power Co., Covert, Mich.
(Contracts DE-AC02-76ET-34215; DE-AC06-76RL-01830)
(DE81-029817; DOE/ET-34215/21) Avail: NTIS HC A04/MF A01

Progress on the Fuel Performance Improvement Program's fuel test and demonstration irradiations is reported for the period of October 1980-March 1981. The purpose of the program is to test and demonstrate improved light water reactor fuel concepts that are more resistant to failure from pellet-cladding interaction during power increases than standard pellet fuel. This would also offer extended burnup potential and, hence, improved uranium utilization. DOE

N82-15219# Wisconsin Univ., Madison. Dept. of Mechanical Engineering.

SURVEY OF PROPOSED METHODS OF BURNING ALCOHOL IN DIESEL ENGINES

D. E. Foster 1980 10 p refs Presented at the Canadian Natl. Power Alcohol Conf., Winnipeg, Manitoba, 20 Jun. 1980
(Contract DE-AC02-79CS-50025)
(DE81-025834; CONF-8006185-1) Avail: NTIS HC A02/MF A01

Different methods of burning alcohol in diesel engines are discussed. The primary difficulty in using alcohol as a diesel fuel is initiation of the flame. The methods are categorized by the ignition technique used; spark or hot surface; pilot injection which includes twin injection and fumigation, cetane improvement and diesel/alcohol mixtures. Each method is analyzed on the basis of the maximum amount of alcohol that can be substituted for diesel fuel and the likelihood for retrofitting on current engines. It is concluded that emulsification and fumigation are currently the two most feasible methods for adapting diesel engines to burn alcohol. DOE

N82-15220# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.

SYSTEMS ANALYSIS OF HYDROGEN/NATURAL GAS SUPPLEMENTATION AND SEPARATION

M. Beller, J. DAcierno, and A. Hermelee Apr. 1981 6 p refs Presented at the 2nd World Congr. of Chem. Eng., Montreal, Oct. 1981
(Contract DE-AC02-76CH-00016)
(DE81-021383; BNL-29520; CONF-811007-5) Avail: NTIS HC A02/MF A01

Specific potential markets for hydrogen are investigated and then examines the mix of customers comprising these markets. The pipeline infrastructure, its capability for use to store and transmit hydrogen, and the incentives and drawbacks in this area are studied. There is sufficient use of both hydrogen and natural gas in potential hydrogen-consuming industries to overcome the problem of reinjection of natural gas into the pipeline after separation. DOE

N82-15221# Oak Ridge National Lab., Tenn. Engineering Technology Div.

FAILURE MODES AND EFFECTS ANALYSIS OF A COAL-SLURRY PREHEATER

H. A. Mitchell, L. F. Parsly, and A. N. Smith Sep. 1981 33 p refs

(Contract W-7405-eng-26)

(DE81-030425; ORNL/TM-7664) Avail: NTIS HC A03/MF A01

Some 55 potential failure modes were identified in a coal slurry preheater, a critical component in a typical coal direct liquefaction plant. Fourteen of these events, if they should occur, would result in losses of sufficient magnitude to require special consideration in the design or operating phase to assure control of risk at an acceptable level. It is concluded that the failure modes and effects analysis technique (FMEA) could be a valuable tool in the identification of critical components for coal conversion systems. For maximum effect, FMEA needs to be used during the initial design phase. Its principal value is to determine high-risk failure modes, which could have unacceptable impacts on system safety and reliability/availability. The usefulness of FMEA can be improved if it is supplemented by the development of a failure data base; this data base could also be of value in selected cases as input to a more detailed technique such as a fault-free analysis. DOE

N82-15222# Oak Ridge National Lab., Tenn. Engineering Technology Div.

COAL AND LIMESTONE FEED TESTING FOR ATMOSPHERIC FLUIDIZED BED COMBUSTION

C. S. Daw, J. F. Thomas, and M. E. Lackey Sep. 1981 78 p (Contract W-7405-eng-36)

(DE81-030629; ORNL/TM-7724) Avail: NTIS HC A05/MF A01

Pneumatic conveying tests of coal and coal limestone mixtures were performed on a conveying system designed to represent the branch feed lines in the TVA 20 MW(e) atmospheric fluidized bed combustor pilot plant. Test conditions were chosen to cover the operating ranges anticipated for the pilot plant. These tests led to a basic understanding of the design and operating problems associated with coal surface moisture, air velocity, fines content, solids loading, and limestone to coal ratio. Coal surface moisture was found to be the most important parameter affecting handling properties. Above a critical level of about six %, surface moisture caused severe compaction problems in the feed hopper and impact plugging in the conveyor line. When surface moisture was less than six %, conveyor line plugging resulted only from saltation and filling. DOE

N82-15223# Department of Energy, Bartlesville, Okla. Energy Technology Center.

HEATING OILS, 1981

Ella Mae Shelton Aug. 1981 44 p refs

(DE81-030833; DOE/BETC/PPS-81/4) Avail: NTIS HC A03/MF A01

The properties of 249 heating oils manufactured by 28 petroleum refining companies in 92 domestic refineries and marketed in the United States were studied and compiled. The data are tabulated according to six grades of fuel and subdivided into five geographic regions in which the fuels are marketed. The six grades of fuels are defined by ASTM Specification D396. The five regions containing a total of 16 marketing districts are shown on a map. Trend charts are included showing average properties of the six grades of fuel for the past several years. Summaries of the results of the tests by grade and by region for 1981 are compared with data for 1980. Analyses of grade 6 foreign import oils are also tabulated. DOE

N82-15224# Department of Energy, Bartlesville, Okla.

MOTOR GASOLINES, WINTER 1980-81

E. M. Shelton Jul. 1981 67 p refs

(DE81-030845; DOE/BETC/PPS-81/3) Avail: NTIS HC A04/MF A01

A compilation of analytical data for 546 samples of motor gasoline produced by 23 manufacturers is presented. The data are tabulated by groups according to brands (unlabeled) and grades for 17 marketing districts into which the country is divided. A map showing marketing areas, districts, and sampling locations is induced. Trends of selected properties of motor fuels since 1959 are charted. Octane distribution percent charts for areas 1, 2, 3, and 4 for unleaded antiknock index (R + M)/2 below 90.0, unleaded antiknock index (R + M)/2 below 93.0, and leaded antiknock index (R + M)/2 93.0 and above grades of gasoline are presented. The antiknock (octane) index (R + M)/2 averages of gasoline sold in this country were 87.6 unleaded below 90.0, 91.4 unleaded 90.0 and above, 89.1 leaded below 93.0, and 93.3 leaded 93.0 and above grades of gasoline. DOE

N82-15225# Texas Univ., Austin. Bureau of Economic Geology.

ASSESSMENT OF IN-PLACE SOLUTION METHANE IN TERTIARY SANDSTONES: TEXAS GULF COAST

A. R. Gregory, M. M. Dodge, J. S. Posey, and R. A. Morton 1981 8 p refs Presented at the 5th Geopressured-geothermal Energy Conf., Baton Rouge, La., 13 Oct. 1981

(Contract DE-AC08-78ET-11397)

(DE81-029772; CONF-811026-5) Avail: NTIS HC A02/MF A01

The total volume of in place methane dissolved in formation waters of deep sandstone reservoirs of the onshore Texas Gulf Coast within the stratigraphic section extending from the base of significant hydrocarbon production (8000 ft) to the deepest significant sandstone occurrence is appraised. Reservoir bulk volume, porosity, and methane solubility were evaluated. The latter is controlled by the temperature, pressure, and salinity of formation waters. Regional assessment of the volume and distribution of potential sandstone reservoirs was made from a data base of 880 electrical well logs, from which a grid of 24 structural dip cross sections and 4 strike cross sections was constructed. These cross sections extend from near the Wilcox outcrop to the coastline. The structural and stratigraphic framework of Tertiary sandstone units was mapped. Structual and stratigraphic frame-boundaries were used to divide the Texas Gulf Coast into 24 subdivisions. Methane content in each of nine formations or divisions of formations was determined for each subdivision. The total in place methane for Tertiary sandstones below 8000 ft in the Texas Gulf Coast was found to be 690 TCF. The total in place methane for effective Tertiary sandstones (sandstone units greater than 30 ft thick) below 8000 ft was 325 TCF. DOE

N82-15226# Battelle Pacific Northwest Labs., Richland, Wash.

THERMOCHEMICAL PRODUCTION OF LIQUIDS FROM BIOMASS

D. C. Elliott 1981 8 p refs Presented at Solar World Forum, Brighton, England, 23 Aug. 1981

(Contract DE-AC06-76RL-01830)

(DE81-030085; PNL-SA-9246; CONF-810865-1) Avail: NTIS HC A02/MF A01

The chemistry of this process is essentially that of the CO-steam process wherein carbon monoxide and water, catalyzed by sodium carbonate, are the reducing agents for the biomass. A water slurry process involving a prehydrolysis step for wood chips has been used to produce the first biomass-derived oil on a large scale. A second variation which requires recycle of a portion of the product for use as the carrier vehicle for wood flour has also been developed to the point of producing multi-barrel quantities of product. An extensive amount of product analysis has been completed on both types of product. They are similar, being highly phenolic and approximately 10% by weight of oxygen. Utilization of the product as a boiler fuel has been tested and other uses of the product are now being investigated. Analytical results and product application tests are discussed. DOE

N82-15227# California Univ., Livermore. Lawrence Livermore Lab.

HIGH-PRESSURE SOLVENT EXTRACTION OF METHANE FROM GEOPRESSURED FLUIDS

R. Quong, H. H. Otuski, F. E. Locke, and R. Netherton Aug. 1981 6 p refs Presented at the 5th Geopressured-Geothermal Energy Conf., Baton Rouge, La., 13-15 Oct. 1981 Submitted for publication

(Contract W-7405-eng-48)

(DE81-027713; UCRL-86515; CONF-811026-2) Avail: NTIS HC A02/MF A01

Technical and economic aspects of solvent extraction as a means of recovering dissolved methane from geopressured-geothermal brines at high pressures are considered. Economic assessment shows that additional investment in a high pressure solvent extraction plant preceding direct injection disposal of brines into isolated aquifers can be profitable. Solvent extraction is compared with other injection methods. The contributions of hydraulic (pressure) energy recovery and geothermal power production are also assessed. The solubilities of a promising solvent, n-hexadecane, and a potential low cost solvent, No. 2 Diesel fuel, were measured in 15 wt percent NaCl solutions at temperatures up to 150 C. Preliminary results of initial extraction tests at 150 C and 1000 psi in sub-pilot scale equipment are also presented. DOE

N82-15228# California Univ., Livermore. Lawrence Livermore Lab.

HIGH-EXPLOSIVE DETONATIONS IN VARYING-OXYGEN ATMOSPHERES

F. R. Kovar, K. R. Trigger, L. G. Guymon, and J. R. Harvey 13 Aug. 1981 6 p refs Presented at the APS Conf. on Shock Waves in Condensed Matter, Menlo Park, Calif., 23-25 Jun. 1981

(Contract W-7405-eng-48)

(DE81-028179; UCRL-86563; CONF-810684-48) Avail: NTIS HC A02/MF A01

Small spheres of PBX9404 AND TNT were detonated in atmospheres of varying oxygen content to study the magnitude of the effects of oxygen on afterburn of high explosive (HE) detonation products (DPs). Each of the fireballs (FBs) formed by the HEDPs was observed by high-speed cameras and radiometers in the visible and near infrared. It was found that afterburn dominates the FB radiation, while having much less influence on FB size than do instabilities and turbulence. One-dimensional nonreactive fluid flow calculations of the FB radius-time (R-T) history and shock characteristics within the FB were performed. The R-T results are in good agreement with the experiment at early times, while the internal shock agreement extends over a much longer period. DOE

N82-15229# Los Alamos Scientific Lab., N. Mex.

GLOBAL KINETICS FOR THE SHOCK-INDUCED DECOMPOSITION OF HETEROGENEOUS EXPLOSIVES

Jerry Wackerle and Allan B. Anderson 1981 13 p refs Presented at the Symp. on Kinetics of Chem. and Phys. Processes, 10th North Am. Thermal Analysis Soc. Conf., New Orleans, 19 Oct. 1981 Submitted for publication

(Contract W-7405-eng-36)

(DE81-025252; LA-UR-81-1835; CONF-811014-3) Avail: NTIS HC A02/MF A01

Methods were developed to determine empirical rate laws for the shock-induced decomposition of condensed explosives. Pressure-field histories are measured with embedded gauges in planewave shock-initiation experiments. A Lagrangian analysis is used to integrate the fluid-dynamic conservation relations, giving the histories of density and energy fields in the reactive flow. A reactant-product equation of state is assumed and a global reaction progress variable and the associated reaction rate are calculated. Correlations of the rate to other state variables provide empirical rate laws, which prove successful in the numerical modeling of numerous initiation and detonation phenomena. Heterogeneous explosive rate laws combining three factors - shock-strength, depletion, and heating - are consistent with many shock-initiation observations and the favored nucleation and growth concept of shock-induced decomposition. DOE

N82-15230# Los Alamos Scientific Lab., N. Mex.

REACTION RATES FROM PRESSURE-GAUGE MEASUREMENTS IN REACTING EXPLOSIVES

M. J. Ginsberg, Allan B. Anderson, and Jerry Wackerl 1981 15 p refs Presented at the 1st Symp. on Gauges and Piezoresistive Mater., Archchon, France, 29-30 Sep. - 1 Oct. 1981

(Contract W-7405-eng-36)

(DE81-030252; LA-UR-81-2482; CONF-810931-3) Avail: NTIS HC A02/MF A01

Hydrodynamic data and an equation of state describing the reaction rates of the explosives PETN, PBX 9404, TATB, and TNT during the shock-to-detontion transition are presented. The data were provided by Manganin pressure gauges embedded in the reacting explosive. Once a pressure-field history was assembled from individual pressure histories at different depths in the explosive, the conservation equations were applied in a Lagrangian analysis of the data. A reactant-product equation of state is combined with this analysis and the extent of reaction and reaction rate are calculated. Successful correlation of the calculated reaction rate values with other thermodynamic variables, such as pressure or temperature, allows formulation of a rate law and the prediction of initiation behavior under circumstances quite different from the experiments that led to the rate law. The relatively thick insulation required on the pressure gage perturbs the flow to some extent. Pressure measurements in reactive flow can now be made routinely with gages that successfully produce data leading to a description of the flow and a powerful predictive capability. DOE

N82-15231# Futures Group, Glastonbury, Conn.

AN ASSESSMENT OF NONFOSSIL HYDROGEN Final Report

E. Fein and T. Munson Dec. 1980 221 p refs Prepared for Gas Research Inst.

(GRI Proj. 50 14-310-0274)

(PB81-246522; GRI-79/0108) Avail: NTIS HC A10/MF A01 CSCL 21D

The potential for hydrogen produced from nonfossil energy sources as an energy carrier is examined. Water electrolysis, thermochemical systems, and various solar radiation processes are evaluated as hydrogen production methods. Long-term and short-term hydrogen storage technologies were also considered. Various possible hydrogen end-uses were appraised, including its role as an industrial chemical, a heating fuel for stationary applications, a vehicular fuel, and an aircraft fuel. The role of coal in future hydrogen production was seen as providing the major competitive technology to nonfossil hydrogen production. Conditions (constraints placed on the use of natural fossil fuels an synthetic fossil fuels) under which hydrogen might be produced primarily from nonfossil energy sources are analyzed. A possible scenario was suggested for the transition to a nonfossil energy era, and areas where hydrogen could be expected contribute to domestic energy needs were indicated. GRA

N82-15232# Massachusetts Inst. of Tech., Cambridge. LNG Research Center.

LIQUID NATURAL GAS RAPID PHASE TRANSITIONS Topical Report, Sep. 1979 - Sep. 1980

George A. Corbin and Robert C. Reid Jan. 1981 99 p refs Prepared for Gas Research Inst.

(PB81-244774; GRI-80/0031) Avail: NTIS HC A05/MF A01 CSCL 21D

An apparatus was constructed to test the concept of initiating a rapid phase transition (RPT) in methane-rich LNG on water by collapsing the vapor film with a shock wave. Helium overpressures were achieved by breaking a diaphragm in a high-pressure helium chamber. Pressure transducers recorded subsequent events. NORPT were noted for liquid nitrogen, liquid ethane, liquid methane or methane-rich LNG even with helium driver pressures up to 62 bar. The helium did, however, greatly enhance the boiling rate of the cryogen on water. On the basis of analytical modelling, it was concluded that a RPT would be very improbable for a methane-rich LNG contacting ambient water in a mode where the surface pressures were high. In the course of the project, a new thermodynamic model was developed as a possible explanation for a RPT in cases where the hot liquid

temperature would exceed the critical temperature of the cryogen. GRA

N82-15233# Southwest Research Inst., San Antonio, Tex.
CHARACTERIZATION OF DIESEL EMISSIONS AS A FUNCTION OF FUEL VARIABLES Final Report, Sep. 1979 - Mar. 1981
Bruce B. Bykowski Mar. 1981 288 p refs
(Contract EPA-68-03-2707)
(PB81-244048; EPA/460-3-81-015) Avail: NTIS HC A11/MF A01 CSCL 21D

Several properties of a refinery 'straight run kerosene', which have a narrow boiling range approximating the middle of a No. 1 diesel fuel, were altered to study their effects on regulated and unregulated exhaust emissions. Eleven fuel blends, representing changes in nitrogen content, aromatic level, boiling point distribution, olefin content, and cetane number, were evaluated. Statistical analysis, including regression, was performed using selected fuel properties as independent variables. Higher aromatic levels are generally associated with increased emissions, while increased olefin levels are generally associated with decrease emissions. GRA

N82-15234# Miami Univ., Fla. Div. of Biology and Living Resources.
PHOTOPRODUCTION OF HYDROGEN BY MARINE BLUE-GREEN ALGAE Progress Report, 15 Aug. 1980 - 14 Feb. 1981
Akira Mitsui 14 Feb. 1981 37 p
(Grant NSF PFR-80-18142)
(PB81-241424; NSF/CPE-81007) Avail: NTIS HC A03/MF A01 CSCL 06A

The growth of Miami BG 7 (Oscillatoria sp.) in seawater was studied using 2.8 liters of Fernbach batch cultures, 14 liters of Carboy batch cultures, and 7 liters of a controlled environment system. In the batch culture tests, both 'instant ocean' and natural seawater from the local environment were used. The effects of adding supplemental nitrate and ammonia to the seawater bases were also examined. The 7-liter controlled environment culture system provides for the control and monitoring of physical and chemical parameters, and can be used for continuous culture experiments. Work on the comparative study of Anabaena cylindrica and Miami BG 7 indicates that their hydrogen metabolism is quite different having a direct bearing on their applied potential. Author

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N82-15235 Laboratoire Central des Ponts et Chaussees, Paris (France). Section des Nouvelles Physiques.
PRESENT POSSIBILITIES FOR THE USE OF MICROWAVES IN CIVIL ENGINEERING: BIBLIOGRAPHICAL STUDY
G. Baillot Jun. 1980 69 p refs In GERMAN; ENGLISH summary
(LBC-95; ISSN-0222-8394) Copyright. Avail: Issuing Activity

The physics which govern the use of microwaves are reviewed. The laws of propagation in different media, the properties of microwaves and resulting possible applications in civil engineering are presented. Concepts are set forth concerning the directional propagation of electromagnetic waves and the generation and amplification of microwaves. Present applications are classed in two categories, according to the physical properties of which use is made. The first deals with applications connected with properties of propagation. These properties provide solutions to various problems, such as the detection of structural defects, the measurement of thicknesses, and the geometric characterization of surfaces. The second class of applications are connected with phenomena of interaction between radiation and matter. Possibilities exist for the measurement of the humidity and temperature of materials. Numerous applications of microwaves as energy sources are cited in fields such as the fusion of hydrocarbon compounds and the drying or the embrittlement of materials. Problems posed by the use of microwaves (electromagnetic pollution, protection against radiation hazards) and legislation in this field are also covered. Author (ESA)

N82-15236 National Physical Lab., Teddington (England). Div. of Mechanical and Optical Metrology.
A BIBLIOGRAPHY OF MICRO-HARDNESS TESTING
I. C. Leigh Sep. 1981 68 p refs
(NPL-MOM-55; ISSN-0309-3069) Copyright. Avail: Issuing Activity

Arranged chronologically by year of publication, this bibliography cites about 900 articles and books which appeared between 1937 and 1980. In addition to hardness measurement and test procedures, ductility, machineability, wear resistance, and tensile strength are considered. An author index is provided. A.R.H.

N82-15237# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Raumfahrt.
SYSTEM ANALYSIS OF ALTERNATIVE PROCEDURES FOR DEEP DRILLING TECHNIQUE FOR DEPTH BETWEEN 6,000 AND 10,000 METERS Final Report, Nov. 1979
Manfred Herbricht, Hans Ostermann, Armin Sowa, Karlheinz Arens (Tech. Univ. Clausthal-Zellerfield, West Germany), Waldhorst Gutsche (Tech. Univ. Clausthal-Zellerfield, West Germany), Claus Marx (Tech. Univ. Clausthal-Zellerfield, West Germany), Thor Noevig (Tech. Univ. Clausthal-Zellerfield, West Germany), Udo Meier (Preussag AG, Hanover), Gerd Schaumberg (Deutsche Schachtbau- und Tiefbohrgesellschaft mbH), and William C. Maurer (Maurer Engineering) Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 258 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-067; ISSN-0340-7608) Avail: NTIS HC A12/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 43,40

Worldwide research activities were carried out in the field of rock destruction. Approximately 30 different techniques are concerned. These techniques were tested for applicability to the deep drilling technique as an alternative drilling method within the range of 6000 to 10,000 m. Approximately 3 to 5 of the drilling techniques can be rated functionally practicable but inferior to the rotary drilling systems. The potential of the drilling speed cannot be utilized due to the limitation of the secondary systems. The rotary drilling system is superior to other systems in economy, efficiency, and reliability. Improvement in the present rotary drilling system can be obtained by intensive research and development. N.W.

N82-15238# Leybold-Heraeus G.m.b.H., Cologne (West Germany).
DEVELOPMENT OF CRYOREFRIGERATORS Final Report, Sep. 1980
Hans-Hermann Klein Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 63 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-107; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13,25

Two types of two-stage Gifford-McMahon- (GM) Refrigerators were developed with different cooling capacities. The GM Refrigerator consists of two components: the coldhead, which produces the cooling capacity, and the compressor unit, which delivers the high pressure helium for the GM-cycle. The design of the coldhead and the compressor unit are described and a short theory of the GM-cycle is presented. Details of the most critical parts such as regenerators, seals at low temperature, dynamic seals, and oil separators are given. Author

N82-15239# Wohlenberg (H.) K.G. G.m.b.H. und Cie., Hanover (West Germany).
MICRO-PROCESSOR-CONTROL FOR CUTTING MACHINES Final Report, Dec. 1980
Ulrich Butter and Walter Glindeman Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 52 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-142; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West

Germany DM 10.95

The CPU controls the keyboard computer and gives guided and controlled user programming along with logical tests of auxiliary function combinations. The machine logic is controlled by the microprocessor and permanently checked. Program administration and total coordination of the systems are taken over by the microprocessor as master. T.M.

N82-15240# Navy Experimental Diving Unit, Panama City, Fla.
SALVAGE OF A USAF F-106 DELTA DART Final Report
Colin A. Kidman and R. A. Bornholdt Jul. 1981 22 p
(AD-A105610; NEDU-5-81) Avail: NTIS HC A03/MF A01 CSCL 13/10

The underwater search, location, and recovery of an F-106 DELTA DART in the Gulf of Mexico is described. The operation covered a span of 20 days. Author

N82-15241# Computers/Structures International, Oakland, Calif.
USER'S GUIDE: COMPUTER PROGRAM FOR THREE-DIMENSIONAL ANALYSIS OF BUILDING SYSTEMS (CTABS80) Final Report
Edward L. Wilson, H. H. Dovey, and Ashraf Habibullah Aug. 1981 113 p Sponsored by Army
(AD-A105513; WES-IR-K-81-9) Avail: NTIS HC A06/MF A01 CSCL 13/3

This report is a user's guide for CTABS80, a computer program for the linear three dimensional structural analysis of multistory frame and shear wall buildings subjected to static or dynamic loadings. In CTABS80, the building is idealized as an assemblage of vertical independent frame and shear wall systems interconnected by horizontal floor diaphragms which are rigid in their own plane. The frame and shear wall systems must basically be of rectangular geometry (in elevation) with vertical columns (or piers) and horizontal beams (or spandrels). However, with special modeling techniques, very complex situations may be considered. A special shear panel element is developed to enable modeling of discontinuous shear walls and shear walls with arbitrary openings. A diagonal bracing element to model braced frames (X-braced, K-braced, or eccentrically braced systems) is also presented. The column, shear panel, and diagonal formulations include the effects of bending, axial, and shear deformations. Bending and shear deformations are also included in the beam formulation; however, the effects of axial deformations are neglected. The effects of the finite dimensions of the beams and columns on the stiffness of a frame or shear wall system are automatically included. GRA

N82-15242# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
THEORETICAL BASIS OF THE DOE-2 BUILDING ENERGY USE ANALYSIS PROGRAM
Richard B. Curtis Apr. 1981 15 p refs Presented at the Intern. Energy Agency Conf., West Berlin, 6-10 Apr. 1981
(Contract W-7405-eng-48)
(DE81-028896; LBL-12300) Avail: NTIS HC A02/MF A01

A user-oriented, public domain, computer program was developed that will enable architects and engineers to perform design and retrofit studies of the energy-use of buildings under realistic weather conditions. The DOE-2.1A has been named by the US DOE as the standard evaluation technique for the Congressionally mandated building energy performance standards (BEPS). A number of program design decisions were made that determine the breadth of applicability of DOE-2.1. Such design decisions are intrinsic to all building energy use analysis computer programs and determine the types of buildings or the kind of HVAC systems that can be modeled. In particular, the weighting factor method used in DOE-2 has both advantages and disadvantages relative to other computer programs. DOE

N82-15243# Texas Univ., Austin. School of Architecture.
CONTINUING DEVELOPMENT OF THE DEROB SYSTEM Quarterly Report, 1 Apr. - 30 Jun. 1981
Arumi-Noe Francisco Jun. 1981 100 p
(Contract DE-AC02-80CS-30254)
(DE81-027971; DOE/CS-30254/4) Avail: NTIS HC A05/MF A01

The daylighting sky factors were calculated for an arbitrary point. The point represents a light meter that can be located anywhere in the simulated structure, and it can be oriented in any direction desired. It reads the sky factor and it can disaggregate the first incidence component from the contributions due to reflections from surfaces, and transmissions from other spaces. The reflected and transmitted components show a marked spatial dependence. The results are compared with standard calculation methods. These standard calculation methods are not capable of discerning the spatial dependence, and they have no capability to account for transmissions from other spaces. The fact that the dynamic energy response of buildings (DEROB) program can describe in detail multispatial interactions allows it to calculate the effect of light-wells, courtyards, solariums on the illumination pattern of simulated spaces. A description of the results of the first set of comparisons, as well as the mathematical theory for multispace coupling is included. DOE

N82-15244# California Univ., Livermore. Lawrence Livermore Lab.
PERSPECTIVE ON PRECISION MACHINING, POLISHING, AND OPTICAL REQUIREMENTS
G. M. Sanger 18 Aug. 1981 15 p refs Presented at the 25th SPIE Intern. Symp., San Diego, Calif., 24 Aug. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE81-028008; UCRL-86579; CONF-810810-22) Avail: NTIS HC A02/MF A01

Simplistic examples of how optical components are specified with respect to form and finish are given. A comparison between optical polishing and precision machining is made, and some thoughts on which technique should be selected for a specific application are presented. A short discussion of future trends related to accuracy, materials, and tools is included. DOE

N82-15245# California Univ., Berkeley. Lawrence Berkeley Lab.
MOBILE INFILTRATION TEST UNIT: ITS DESIGN AND CAPABILITIES, PRELIMINARY EXPERIMENTAL RESULTS
A. K. Blomsterberg, M. P. Modera, and D. T. Grimsrud Jan. 1981 21 p refs
(Contract W-7405-eng-48)
(DE81-031927; LBL-12259) Avail: NTIS HC A02/MF A01

The mobile infiltration test unit (MITU), a 12 sq m construction-site office trailer modified to provide long-term field data for air infiltration studies, is described. The trailer and its instrumentation, including some preliminary tests of the individual measurement systems, are discussed. It has a completely automated data acquisition system that records air infiltration rates, surfaces pressures, and weather as half-hour averages. The shell of the trailer is well sealed, and the quantity, type, and distribution of leakage area are controlled using removable leakage panels in 16 window openings. Using the trailer's fan pressurization system, the background leakage area of the shell was measured to be 12 sq cm while the two types of leakage panels have leakage areas of 13 sq cm and 17 sq cm. The infiltration measurement system was tested by inducing a known flow rate with the fan pressurization system, and predicted the flow rates to within 10% in all cases. DOE

N82-15246# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
CRYOPUMPING OF HYDROGEN AND HELIUM
H. J. Halama, H. C. Hseuh, and T. S. Chou 1981 8 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10-14 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030553; BNL-30012; CONF-810835-29) Avail: NTIS HC A02/MF A01

Results obtained in numerous tests on small and large cryopumps cooled to 4.2 K by LHe or between 10 to 20 K by closed-cycle helium refrigerator are summarized. Then, measurements of the compound cryopump, designed to work on Tokamaks to handle the exhaust gases from the Torus are presented. DOE

N82-15247# Argonne National Lab., Ill.
PERFORMANCE PREDICTIONS OF PASSIVE SOLAR COMMERCIAL BUILDINGS
T. L. Kurbowski 1981 5 p refs Presented at 2nd Natl. Tech. Conf. on Earth Sheltered Buildings, Tulsa, Okla., 16 Oct. 1981

(Contract W-31-109-eng-38)
(DE81-027979; CONF-811034-1) Avail: NTIS HC A02/MF A01

Many Earth bermed and high mass commercial structures tending to require cooling and lighting rather than heating were designed, built, and instrumented to record segregated or partitioned energy usage. Design solutions, preliminary performance, and cost information are addressed for the earth integrated projects. DOE

N82-15248# Los Alamos Scientific Lab., N. Mex.
HEATING REMOTE ROOMS IN PASSIVE SOLAR BUILDINGS
J. Douglas Balcomb 1981 6 p refs Presented at the Solar World Forum, Brighton, Eng., 23-28 Aug. 1981
(Contract W-7405-eng-36)
(DE81-030247; LA-UR-81-2518; CONF-810865-2) Avail: NTIS HC A02/MF A01

The heating of remote rooms by convection through a connecting doorway is investigated. A simple steady-state equation is developed for design purposes. Validation of a dynamic model was achieved using data obtained over a 13-day period. Dynamic effects were investigated using a simulation analysis for three different cases of driving temperature; the effect is to reduce the temperature difference between the driving room and the remote room compared to the steady-state model. For large temperature swings in the driving room a strategy which uses the intervening door in a diode mode is effective. The importance of heat-storing mass in the remote room is also investigated. DOE

N82-15249# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
CYCLE DESIGN FOR THE ISABELLE HELIUM REFRIGERATOR
D. P. Brown, A. P. Schlafke, K. C. Wu, and R. W. Moore (Koch Process Systems) 1981 8 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10-14 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030551; BNL-30006; CONF-810835-21) Avail: NTIS HC A02/MF A01

The superconducting magnets for the ISABELLE storage ring/accelerator are designed to be operated at 3.8 K using a forced-flow supercritical helium cooling system. The ISABELLE refrigerator has been designed subject to these special requirements. The design output is 13.65 KW of refrigeration below 4.2 K (for cooling the magnet and distribution system), 55 KW at 55 K (to cool heat shields for the whole system) and 100 g/s of liquefaction (for magnets power leads cooling). The system incorporates a sub-cooler section that produces liquid helium at 5.3 atm and 2.6 K and circulates it through the loads, and a Claude-type main refrigerator section. The main refrigerator section has five stages of cooling, with four of them below liquid nitrogen temperature. Liquid nitrogen precooling is not used. With 60% isothermal compressors the efficiency of the refrigerator system will be about 26% of Carnot. DOE

N82-15250# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
ANALYSIS OF COOLDOWN PERFORMANCE FOR ISABELLE HELIUM REFRIGERATOR
K. C. Wu, D. P. Brown, and R. W. Moore (Koch Process Systems) 1981 7 p refs Presented at the 1981 Cyrog. Eng. Conf., San Diego, Calif, 10 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030548; BNL-30009; CONF-810835-22) Avail: NTIS HC A02/MF A01

The ISABELLE refrigerator was designed to provide cooling for 1000 superconducting magnets. It has the dual duty of providing cooling at steady-state operating conditions and to cooldowm massive magnets from ambient temperature. During the cooldown, tremendous quantities of heat must be removed from the magnets and 75,000 liters of cold helium must be supplied to fill the system. In the planning for ISABELLE, this procedure has been estimated to require approximately two weeks. Because of this long cooldown time and the fact that during cooldown the refrigerator will be operated quite differently from its steady-state design configuration, it is important to maximize the cooling capacity and identify the cooldown procedure. DOE

N82-15251# Lehigh Univ., Bethlehem, Pa. Dept. of Metallurgy and Materials.
COMPARISON OF HYDROSTATIC EXTRUSION VERSUS WIRE DRAWING AS A METHOD OF PRODUCING NbSUB3Sn SUPERCONDUCTING WIRE
V. Thadani, B. Avitzur, Y. T. Chou, and T. S. Luhman 1981 5 p refs Presented at the 9th North Am. Manuf. Research Conf., University Park, Penn., 19-22 May 1981
(Contract DE-AC02-76CH-00016)
(DE81-030275; BNL-29941; CONF-8105111-1) Avail: NTIS HC A02/MF A01

The conventional manufacturing process for Nb3Sn multifilamentary superconducting wire is a combination of hot extrusion and wire drawing. An alternative process, cold hydrostatic extrusion, was developed. All experimental data pertaining to the hydrostatic extrusion process are presented, and a comparison is made between the two manufacturing methods. The results show that monofilamentary Nb3Sn wire produced by hydrostatic extrusion not only has good superconducting properties, but also that larger reductions are achieved per pass, and fewer and shorter intermediate anneals are required in its manufacture. DOE

N82-15252# Kernforschungszentrum, Karlsruhe (West Germany).
AUTOMATION OF A 5 M ROLLING MILL FOR THERMO-MECHANICAL ROLLING OF HEAVY PLATE
F. Agte (Mannesmannroehren-Werke AG), G. Fuesers (Mannesmannroehren-Werke AG), K.-U. Jannsen (Mannesmannroehren-Werke AG), P. Schiefer (Mannesmannroehren-Werke AG), and K. Stallmann (Mannesmannroehren-Werke AG) Aug. 1979 46 p refs In GERMAN; ENGLISH summary
(KfK-PDV-168) Avail: NTIS HC A03/MF A01

The rolling processes applied for the manufacture of heavy plate, the so-called normal rolling and thermomechanical rolling, are illustrated. The thermomechanical rolling method is dealt with in consideration of the strategy used in the combination of rolling and cooling rates. Scope of duties and aims of automation as well as setup and mode of operation of the process control system are described. In addition, the project flow is discussed; some of the problems encountered while putting the installation into operation are mentioned. M.G.

N82-15253# Naval Surface Weapons Center, White Oak, Md.
LIGHT DEPOLARIZATION AS A MEASURE OF PAVEMENT SURFACE TEXTURE Final Report, May 1974 - Mar. 1981
W. C. Spring, III and W. L. King, Jr. Aug. 1981 75 p refs
(PB81-241507; NSWC/WOL-E-24; FHWA/RD-81/108) Avail: NTIS HC A04/MF A01 CSCL 13B

The feasibility of using light depolarization to measure pavement surface textures was determined. A prototype vehicle-mounted depolarization measuring instrument was used. The wavelength that produces the highest correlation between the depolarization values and the conventional measurements was determined. It is indicated that improved correlations occur in the near infrared region. It is concluded that a vehicle mounted depolarization instrument can be constructed that will correlate satisfactorily with skid numbers or other textural measurements. GRA

N82-15254# Marquette Univ., Milwaukee, Wis. Dept. of Civil Engineering.
VERTICAL MOTION OF HIGHWAY BRIDGE STRUCTURE DUE TO AN EARTHQUAKE
Chai Hong Yoo, Samir V. Acra, and Jao-Shiun Kao Jan. 1981 142 p refs
(Grant NSF PFR-78-22845)
(PB81-235319; MUCE-81-1; NSF/CEE-81021) Avail: NTIS HC A07/MF A01 CSCL 13B

The dynamic response of continuous highway bridge superstructures due to pulsating support settlements induced by an earthquake is investigated. A governing differential equation for the dynamic behavior of bridge superstructures under pulsating support settlements was formulated and a Fourier series type solution method is presented. The results are compared to those obtained by a dynamic three moment equation. Four separate

computer programs were developed to facilitate the analysis and comparisons. The concept of dynamic amplification factors as the ratios of dynamic responses to static responses was developed and subsequent charts were plotted. Unusually high dynamic amplifications were observed, particularly in shearing forces. GRA

N82-15255# Monsanto Research Corp., Dayton, Ohio.
WASTE PLASTIC RECYCLING INFORMATION EXCHANGE. VOLUME 1: SUMMARY REPORT
1981 66 p Sponsored in part by EPA, Washington, D. C.
(PB81-242273; NATO/CCMS-123-Vol-1) Avail: NTIS HC A04/MF A01 CSCL 13B

Study determined status of plastic scrap and waste recycling in the participating NATO countries. The analysis provides general conclusions and make specific recommendations. GRA

N82-15256# Hampton (Delon) and Associates, Silver Spring, Md.
REPRESENTATIVE GROUND PARAMETERS FOR STRUCTURAL ANALYSIS OF TUNNELS. VOLUME 1: RATIONAL APPROACH TO SITE INVESTIGATION Final Report, Mar. 1981
R. B. Peck, T. L. Brekke, and Delon Hampton Mar. 1981 30 p refs
(Contract DOT-FH-11-9150)
(PB81-236432; FHWA-RD-80/012-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 13B

The planning and implementation of programs for tunnel design and construction are considered. Geotechnical problems peculiar to tunneling, settings for specific tunneling problems, approaches to exploration for identifying problems, and specific procedures for site investigations and their evaluation. It is intended that this document will provide guidance to those engineers responsible for the planning and implementation of site investigation programs related to tunnel design and construction. GRA

N82-15257# Hampton (Delon) and Associates, Silver Spring, Md.
REPRESENTATIVE GROUND PARAMETERS FOR STRUCTURAL ANALYSIS OF TUNNELS. VOLUME 3: TUNNEL DESIGN AND CONSTRUCTION Final Report, 23 Sep. 1976 - 31 Dec. 1980
D. Hampton, J. S. Jin, and J. P. Black Mar. 1981 205 p refs
(Contract DOT-FH-11-9150)
(PB81-236440; FHWA/RD-80/014-Vol-3) Avail: NTIS HC A10/MF A01 CSCL 13B

Currently used analytical design procedures are summarized. The geotechnical parameters required as input into these design procedures and their significance are determined. GRA

N82-15258# Southwest Research Inst., San Antonio, Tex.
DETECTION OF FLAWS IN REINFORCING STEEL IN PRESTRESSED CONCRETE BRIDGE MEMBERS Final Report, Apr. 1976 - Feb. 1979
F. N. Kusenberger and J. R. Barton Apr. 1981 197 p refs
(Contract DOT-FH-11-8999)
(PB81-241630; FHWA/RD-81/087) Avail: NTIS HC A09/MF A01 CSCL 13C

Development of a practical nondestructive method for detecting deterioration in the reinforcement of prestressed concrete bridge structural members in situ is discussed. A preliminary magnetic inspection equipment is described. Records from laboratory evaluations using a 20 ft (6m) section of Texas Type 'C' beam and from field evaluations are presented. Similarities between laboratory and field inspection signatures are indicated. Prominent anomalous signatures are shown which correlated with steel elements. Other field signatures which indicated stirrup configuration in the post-tension girders was not in accordance with the plans. Correlation investigations are described which illustrate promising electronic signature enhancement and recognition methods for discriminating between steel artifacts and deterioration. GRA

N82-15259# SRI International Corp., Menlo Park, Calif.
THE EFFECT OF FIRE RETARDANTS ON THE HEAT-RELEASE RATE OF BUILDING MATERIALS Interim Report, 1 Oct. 1978 - 30 Jun. 1980
Stanley B. Martin and Larwrence B. Inman Jul. 1981 40 p refs
(Contract NBS-EO-A01-78-3559)
(PB81-238487; NBS-GCR-81-329) Avail: NTIS HC A03/MF A01 CSCL 13M

A method was developed for making up thick cellulosic specimens with thermocouples implanted at various depths to determine the time dependent temperature profiles when exposed to external radiant fluxes. Specimens of alpha cellulose, both untreated and treated with 2 percent by weight of $Na_2B_4O_7$, were exposed to an applied radiant flux of 3.7 W/sq cm in the heat release rate calorimeter in order to examine the effect of the fire retardants on the heat release rate. The results on a limited number of tests suggest that the char enhancement, produced by the presence of $Na_2B_4O_7$, reduces the heat release rate mainly by the reduction of the caloric value of the volatile products rather than by the insulating effect of the increased char layer thickness. GRA

N82-15260# Purdue Univ., Lafayette, Ind. School of Civil Engineering.
HYSTERESIS IDENTIFICATION OF MULTI-STORY BUILDINGS
Sassan Toussi and James T. P. Yao May 1981 96 p refs
(Grant NSF PFR-79-06296)
(PB81-235921; CE-STR-81-15) Avail: NTIS HC A05/MF A01 CSCL 13M

Results of the estimation of the behavior of multi-degree-of-freedom (MDOF) structural systems are reported. First, the hysteresis identification method and the corresponding error criterion are presented. The error criterion is a least-squares estimation procedure which is applied to both a constrained and an unconstrained problem. Then, a lumped-mass model used to form 'M' different independent responses from the response of an 'M' degrees of freedom structure is described. The model allows each one of the 'M' responses to be considered as the output of a single-degree-of-freedom (SDOF) structural system. Finally, the identification technique is applied to estimate the inter-story behavior of a laboratory tested, reinforced concrete frame. In addition, the effect of damping in the response of high-rise buildings was examined. GRA

N82-15261# Purdue Univ., Lafayette, Ind. School of Civil Engineering.
INEXACT INFERENCE FOR RULE-BASED DAMAGE ASSESSMENT OF EXISING STRUCTURES
Mitsuru Ishizuka, King-Su Fu, and James T. P. Yao Feb. 1981 23 p refs
(Grant NSF PFR-79-06296)
(PB81-235913; CE-STR-81-5) Avail: NTIS HC A02/MF A01 CSCL 13M

A rule-based damage assessment system of existing structures (SPERIL) subjected to earthquake excitation is described. The principal of inexact inference is applied to obtain a rational solution. Both the fuzzy set theory and a production system, with a certainty factor, are used jointly in the inexact inference to deal with the continuous nature of the damage state and to attain the modularity of uncertainty. An inference network diagram for the damage assessment of existing structures is included. GRA

N82-15262# Bureau of Mines, Boulder City, Nev. Metallurgy Research Lab.
STATE-OF-THE ART GUIDELINE MANUAL FOR DESIGN, QUALITY CONTROL AND CONSTRUCTION OF SULFUR-EXTENDED-ASPHALT (SEA) PAVEMENTS Final Implementation Package
W. C. McBee, T. A. Sullivan, and J. O. Izatt Aug. 1980 61 p refs Prepared in cooperation with Sulphur Inst.
(PB81-242547; FHWA/IP-80/14) Avail: NTIS HC A04/MF A01 CSCL 13C

Sulfur-Extended-Asphalt (SEA) binders save asphalt, a potential energy source, by replacing some asphalt in conventional flexible pavement mixes with sulfur. These new binders appear to possess properties comparable to asphalt. The guideline manual discussed provides the highway community in both public and private organizations with the most definitive state-of-the-art guidelines extant for using these binders. Information on design,

construction, quality control, equipment, mixing plants, specifications, and safety is included. Administrators and professionals in pavement construction, design, maintenance, and materials testing will be the personnel who are most interested in the manual.
GRA

N82-15263# Northeastern Univ., Boston, Mass. Dept. of Civil Engineering.
PROBABILISTIC ANALYSIS FOR LIQUEFACTION
M. K. Yegian and B. M. Vitelli Mar. 1981 109 p refs
(Grant NSF PFR-78-23082)
(PB81-249724; NSF/CEE-81029) Avail: NTIS HC A06/MF A01 CSCL 08M

A comprehensive review of liquefaction case histories was made and an expanded data set was prepared. The newly compiled field data are presented together with a criterion for liquefaction based on the field observations of liquefaction and nonliquefaction. A simple model for calculating the probability of liquefaction conditional to the occurrence of a particular seismic event is given. Applications of the proposed criterion and the probability model are discussed and comparisons are made between the results of this research and those previously published. Specific applications of the proposed method include an evaluation of overall liquefaction risk at a site and estimation of earthquake-generated excess pore pressures. It is concluded that liquefaction analysis procedures, which are invariably based on field observations, include significant uncertainties because of the imperfect nature of the data used. Use of the probability model presented herein permits proper evaluations of these uncertainties.
Author

N82-15264# Purdue Univ., Lafayette, Ind. Joint Highway Research Project.
PREDICTION AND CONTROL OF FIELD SWELL PRESSURES OF COMPACTED MEDIUM PLASTIC CLAY Interim Report
Gregory M. Terdich 17 Mar. 1981 188 p refs Sponsored in part by Indiana State Highway Commission and Federal Highway Administration
(PB81-242471; JHRP-81-4; FHWA/IN/JHRP-81/4) Avail: NTIS HC A05/MF A01 CSCL 08M

The swelling pressure response of a medium plastic clay (AASHTO A-6) compacted both in the field and in the laboratory was investigated. Correlation was attempted to provide a prediction process for the field result. Swelling pressure was controlled by water content deviation from optimum, compactive effort, dry density, and various interactions among these terms. Regression models for laboratory and field results are different. Variability in dry density and swelling pressure was sizeable but predictable, with the field variability being larger. Prediction models were developed for expected average and maximum swelling pressure. Charts enable the engineer to select the compaction variables that will control the swelling pressure to desired maximum value. A computer program was created to predict maximum swelling pressure.
GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

N82-15265 Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).
IMPROVEMENT OF RADAR TARGET SEARCHES BY A RANGE DEPENDENT DETECTION THRESHOLD OR SIGNAL AMPLIFICATION [VERBESSERUNG DER RADARZIEL-SUCHE DURCH EINE ENTFERNUNGSABHAENGIGE ENTDECKUNGSSCHWELLE ODER SIGNALVERSTAR-KUNG]
E. Hanle Oct. 1980 22 p refs In GERMAN; ENGLISH summary
(FFM-301) Copyright. Avail: Issuing Activity

The impact of signal amplification on the search for targets with different radar cross sections was studied. A clear presentation of the whole range dependence with minimum computing expense was obtained by restriction to single pulse operation. Through a suitable range controlled threshold with half the transmitting energy, the same detection probability at maximum range is obtained as with a fixed threshold. The detection probability at short ranges is reduced, resulting in a reduced detection range for targets with small cross sections or under strong electronic countermeasures conditions.
Author (ESA)

N82-15266 Fernmeldetechnisches Zentralamt, Darmstadt (West Germany). Forschungsinst.
AN MS43 BLOCK CODE HAVING AN ERROR MULTIPLICATION SMALLER THAN THAT OF THE MMS43 CODE AND A REDUCED PORTION OF THE POWER DENSITY SPECTRUM NEAR THE FREQUENCY ZERO
Guenter Morgenstern May 1981 18 p refs In GERMAN; ENGLISH summary
(FTZ-FI-044-TBr-88) Avail: Issuing Activity

Analysis of the code tables show that both in the case of MMS43 and of V-MS43, the error multiplication occuring in block-by-block decoding can be reduced by permutations without changes in the signal spectrum by about 15%. Since the V-MS43 block code in addition decreases the portion of the power density spectrum of the signal near the frequency zero the signal interference with neighboring blocks is reduced.
Author (ESA)

N82-15267 Fernmeldetechnisches Zentralamt, Darmstadt (West Germany). Forschungsinst.
COST FUNCTIONS OF THE LONG-TERM PLANNING OF DIGITAL TRANSMISSION SYSTEMS USING COAXIAL CABLES [KOSTENFUNKTIONEN FUER DIE LANGFRISTIGE PLANNUNG VON DIGITALSIGNAL-UEBERTRAGUNGSSYSTEME AUF KOAXIALKABELN]
Ruth Kleinewillinghoefer Mar. 1981 22 p refs In GERMAN; ENGLISH summary
(FTZ-FI-03-TBr-14) Avail: Issuing Activity

The cost mainly depends on the number of channels, i.e., the demand at the end of the planning term, the length of the transmission link, and the level of multiplexing at the transfer nodes. Cost functions were derived for specific transmission systems and bit rates which are all shown to be continuous and, depending on the demand, either linear or concave.
Author (ESA)

N82-15268 Fernmeldetechnisches Zentralamt. Darmstadt (West Germany). Forschungsinst.
ATTENUATION OF COAXIAL PAIRS IN THE LOWER FREQUENCY RANGE
Hans-Werner Wellhausen May 1981 24 p refs In GERMAN; ENGLISH summary
(FTZ-FI-21-TBR-51) Avail: Issuing Activity

The design of digital transmission systems for coaxial cables using redundancy-free line signals and for systems which are to occupy non-utilized frequency bands below the carrier frequencies requires exact knowledge of the attenuation behavior of the frequency range coming into question. Starting from the determination of the load per unit length, the effective attenuation and its components (attenuation constant, reflection loss, interaction loss) are calculated and discussed for the lengths of coaxial pairs existing in the German Bundesport network. Author

N82-15269 Fernmeldetechnisches Zentralamt, Darmstadt (West Germany). Forschungsinst.
A 16 QAM MODEM FOR A 140 Mbit/SEC RADIO RELAY SYSTEM [EIN 16 QAM-MODEM FUER 140 Mbit/SEC-RICHTFUNKSYSTEME]
Werner Lorek May 1981 34 p refs In GERMAN; ENGLISH summary
(FTZ-FI-21-TBR-20) Avail: Issuing Activity

Various frequency-economical modulation procedures for the planned change-over of the 4 GHz radio-relay band to 140 Mbit/s digital signals are compared. The structure of a 16 QAM modem, and the circuit design are described. The functions of the individual components are illustrated by measurement results or circuit diagrams. For the carrier recovery, the received 16 QAM signal is converted into a 4 PSK signal, from which a fixed reference phase for the phase control of the carrier can be derived with the aid of frequency quadruplication. First measurements of the

error rate by means of an analog radio-relay channel show an acceptable approximation to the theoretical expectation. It is demonstrated that, with the aid of 16 QAM, 140 Mbit/s signals will probably fit in with the analog 80 MHz channel bandwidth of the radio-relay system. Author

N82-15270*# Operations Research, Inc., Silver Spring, Md. Space Engineering and Communication Systems Div.

PROPAGATION EFFECTS HANDBOOK FOR SATELLITE SYSTEMS DESIGN: A SUMMARY OF PROPAGATION IMPAIRMENTS ON 10 TO 100 GHz SATELLITE LINKS WITH TECHNIQUES FOR SYSTEM DESIGN

R. D. Kaul and R. G. Wallace Dec. 1981 423 p refs
(Contract NASw-3431)
(NASA-RP-1082; ORI-TR-1905) Avail: NTIS HC A18/MF A01 CSCL 14N

The major propagation effects experienced on Earth-space communications paths in the 10 to 100 GHz frequency range. Attenuation due to rain is dealt with in detail. For individual titles, see N82-15271 through N82-15276.

N82-15271*# Operations Research, Inc., Silver Spring, Md. Space Engineering and Communication Systems Div.

CHARACTERISTICS OF RAIN AND RAIN SYSTEMS

In its Propagation Effects Handbook for Satellite Systems Design Dec. 1981 p 5-39 refs (For primary document see N82-15270 06-32)
Avail: NTIS HC A18/MF A01 CSCL 14N

The description and measurement of the macroscopic and microscopic characteristics of rain and rain systems are discussed. The statistical relationships of these characteristics and their effect on polarization and attenuation are considered. Macroscopic characteristics include the size, distribution, and movements of rain cells, the height of melting layers, and the presence of ice crystals. Microscopic characteristics include the size distribution, density, and oblateness of rain drops and ice crystals. The estimation of a major propagation effect, specific attenuation, is described. J.D.H.

N82-15272*# Operations Research, Inc., Silver Spring, Md. Space Engineering and Communication Systems Div.

AN OVERVIEW OF SEVERAL RAIN AND ATTENUATION MODELS

In its Propagation Effects Handbook for Satellite Systems Design Dec. 1981 p 41-101 refs (For primary document see N82-15270 06-32)
Avail: NTIS HC A18/MF A01 CSCL 14N

The key features of the Rice-Holmberg, Dutton-Dougherty, Global, Lin, and Piecewise Uniform Rain Rate models for estimation of cumulative attenuation statistics on Earth-space millimeter paths are summarized. The models provide either rain rate statistics or attenuation statistics, which can be related by use of the specific attenuation and the effective path length relation. The effective path length is defined. The advantages and disadvantages of each model for specific applications are discussed. The Global model is recommended as the design tool for predicting propagation effects in Earth-space communication systems. J.D.H.

N82-15273*# Operations Research, Inc., Silver Spring, Md. Space Engineering and Communication Systems Div.

DEPOLARIZATION ON EARTH-SPACE PATHS

In its Propagation Effects Handbook for Satellite Systems Design Dec. 1981 p 103-154 refs (For primary document see N82-15270 06-32)
Avail: NTIS HC A18/MF A01 CSCL 14N

Sources of depolarization effects on the propagation paths of orthogonally-polarized information channels are considered. The main sources of depolarization at millimeter wave frequencies are hydrometeor absorption and scattering in the troposphere. Terms are defined. Mathematical formulations for the effects of the propagation medium characteristics and antenna performance on signals in dual polarization Earth-space links are presented. Techniques for modeling rain and ice depolarization are discussed. J.D.H.

N82-15274*# Operations Research, Inc., Silver Spring, Md. Space Engineering and Communication Systems Div.

PROPAGATION DATA BASES

In Its Propagation Effects Handbook for Satellite Systems Design Dec. 1981 p 155-194 refs (For primary document see N82-15270 06-32)
Avail: NTIS HC A18/MF A01 CSCL 14N

Existing data bases accumulated as the result of experiments to gather propagation data on millimeter wave Earth-space links are described. The satellites used are described and results of the significant experiments conducted in the United States are summarized. The data bases consist primarily of cumulative attenuation statistics, though some depolarization measurements are included. Additional summaries of propagation data are cited. J.D.H.

N82-15275*# Operations Research, Inc., Silver Spring, Md. Space Engineering and Communication Systems Div.

PREDICTION TECHNIQUES

In its Propagation Effects Handbook for Satellite Systems Design Dec. 1981 p 195-348 refs (For primary document see N82-15270 06-32)
Avail: NTIS HC A18/MF A01 CSCL 14N

Prediction methods and related propagation results for the evaluation of Earth-space communication paths operating above 10 GHz are presented. Gaseous attenuation, rain, cloud, fog, sand, and dust attenuation, path diversity, signal fluctuations and low angle fading, depolarization effects, bandwidth coherence, and sky noise are considered. J.D.H.

N82-15276*# Operations Research, Inc., Silver Spring, Md. Space Engineering and Communication Systems Div.

APPLICATION OF PROPAGATION PREDICTIONS TO EARTH/SPACE TELECOMMUNICATIONS SYSTEM DESIGN

In its Propagation Effects Handbook for Satellite Systems Design Dec. 1981 p 349-404 refs (For primary document see N82-15270 06-32)
Avail: NTIS HC A18/MF A01 CSCL 14N

The corresponding between a given propagation phenomenon and system performance is considered. Propagation data are related to system performance parameters, allowing the systems engineer to perform the analyses determining how well requirements are met by a given system design, and enabling the systems engineer to modify that design if necessary. The various ways of specifying performance criteria for different kinds of systems are discussed, and a general procedure for system design is presented and demonstrated. J.D.H.

N82-15277*# Old Dominion Univ., Norfolk, Va. Dept. of Electrical Engineering.

AIRBORNE ANTENNA PATTERN CALCULATIONS Final Report, 1 Nov. 1980 - 31 Oct. 1981

Timothy J. Knerr, Teri M. Owens, and Roland R. Mielke Dec. 1981 322 p refs
(Grant NsG-1655)
(NASA-CR-165059) Avail: NTIS HC A14/MF A01 CSCL 20N

Calculated principal-and off-principal plane patterns are presented for the following aircraft: de Havilland DHC-7, Rockwell Sabreliner 75A, Piper PA-31T Cheyenne, Lockheed Jet Star II, Piper PA-31-350 Navajo Chieftain, Beechcraft Duke B60, Rockwell Commander 700, Cessna Citation 3, Piper PA-31P Pressurized Navajo, Lear Jet, and Twin Otter DHC-6. Author

N82-15278*# Virginia Univ., Charlottesville. Semiconductor Device Lab.

INVESTIGATION OF SEMICONDUCTOR CLAD OPTICAL WAVEGUIDES Semiannual Status Report,

T. E. Batchman and G. M. McWright Dec. 1981 25 p refs
(Grant NAG1-177)
(NASA-CR-165074; UVA/528207/EE81/101) Avail: NTIS HC A02/MF A01 CSCL 14N

The properties of semiconductor-clad optical waveguides based on glass substrates were investigated. Computer modeling studies on four-layer silicon-clad planar dielectric waveguides indicated that the attenuation and mode index should behave as exponentially damped sinusoids as the silicon thickness is decreased below one micrometer. This effect can be explained as a periodic coupling between the guided modes of the lossless

structure and the lossy modes supported by the high refractive index silicon. The computer studies also show that both the attenuation and mode index of the propagating mode are significantly altered by conductivity charges in the silicon. Silicon claddings were RF sputtered onto AgNO3-NaNO3 ion exchanged waveguides and preliminary measurements of attenuation were made. An expression was developed which predicts the attenuation of the silicon clad waveguide from the attenuation and phase characteristics of a silicon waveguide. Several applications of these clad waveguides are suggested and methods for increasing the photo response of the RF sputtered silicon films are described. M.G.

N82-15279# Siemens A.G., Munich (West Germany). Werk fuer Integrierte Schaltungen.
INTEGRATED CIRCUITS FOR TV AND RADIO APPLICATIONS Final Report, Dec. 1979
Helmut Bichler, Helmut Deppe, Josef Fenk, Gerhard Gehring, Guenter vonHaefen, Walter Haberl, Walter Kellner, Hans Kriedt, Dietmar Mallon, Gerald Muendel et al Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 117 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-088; ISSN-0340-7608) Avail: NTIS HC A06/MF A01

This was achieved by: improving the electrical properties of existing IC's and simultaneously reducing the peripheral circuitry and the manufacturing costs; combining several circuits in a single complex IC; and replacing of circuitry previously made from discrete components by new integrated circuits. The newly developed IC's are described. All problems and their solutions connected with the development, the manufacture and the testing of the circuits are reported. The circuits described are mainly for use in the RF-, IF- and AF-sections, the power supply and the display and control sections of radio and TV-receivers. The development of two new process lines for the manufacture of RF-circuits and circuits operating at supply voltages of up to 45 volts is also reported. T.M.

N82-15280# Eckardt A.G., Stuttgart (West Germany).
STUDY OF THE STRUCTURE OF A PROCESS CONTROL SYSTEM CONSISTING OF UNITS FOR SIGNAL PROCESSING, OPERATOR STATIONS AND PROCESS COMPUTER Final Report, May 1980
Hans Unkel Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 52 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-135; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10,95

Large scale integrated circuits were used to develop a system for optimizing process control in automatically controlled plants. The system designed consists of units for signal processing which are linked by a data bus with color CRT stations for display and operation. A.R.H.

N82-15281# AEG-Telefunken, Backnang (West Germany). Fachbereich Weitverkehr und Kabeltechnik.
SYSTEM CONCEPTS AND BASIC TECHNOLOGIES FOR RECEIVER COMPONENTS OF DIGITAL RADIO LINK SYSTEMS AT 20 GHz Final Report, Jan. 1979
Juergen Marquardt, Wolfgang Ehrlinger, Martin Glauner, Gerhard Groebner, Wolfgang Hauth, and Nikolaos Rigos Bonn Bundesminisierium fuer Forschung und Technologie Sep. 1981 274 p refs In GERMAN; ENGLISH summary Sponsored by Bundesminisierium fuer Forschung und Technologie
(BMFT-FB-T-81-166; ISSN-0340-7608) Avail: NTIS HC A12/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 43,90

As starting point for the system development of digital broadband-transmission at 20 GHz, the optimum modulation code is found considering various boundary conditions. Based on this result the design of the RF-filters for a system was demonstrated. After a refinement of the necessary basic technology design procedures was worked out for planar integrated microwave circuits at 20 GHz, design rules for housing dimensions and minimized length transistions between rectangular and planar waveguides are presented. T.M.

N82-15282# Institut fuer Zukunftsforschung G.m.b.H., Berlin (West Germany).
DATA PROTECTION OF COMPUTER AIDED TELECOMMUNICATION SYSTEMS Final Report, Oct. 1980
Peter Berger, Gunnar Grugelke, Guenter Jensen, Johanna Kratzsch, Rolf Kreibich, Helgomar Pichlmayer, and Jochen Peter Spohn Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 448 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FR-DV-81-006; ISSN-0170-9011) Avail: NTIS HC A19/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 61-20

The aim of the investigation of computer aided telecommunication systems. Existing and/or planned data protection problems that accompany emergency alert systems in the transportation sector, in interactive videotex, in two-way-cable TV, and in integrated office communication systems were examined. The services offered by the telecommunication systems imply the processing of user (participants) data and of data originated by the telecommunication process itself. It is concluded that data protection problems of computer aided telecommunication systems can not be reduced to the fact of simple misuse. T.M.

N82-15283# North Carolina Univ. at Chapel Hill. Dept. of Statistics.
INFORMATION CAPACITY OF GAUSSIAN CHANNELS
Charles R. Baker Sep. 1981 19 p refs
(Contract N00014-75-C-0491)
(AD-A105659) Avail: NTIS HC A02/MF A01 CSCL 09/4

A communication channel without feedback, with transmitted signal A(X), and with additive Gaussian noise N is considered. The information capacity C of this channel is obtained by stochastic process subject to certain constraints. The class of admissible processes W includes all Gaussian processes having induced measure equivalent to the measure induced by M. J.D.H.

N82-15284# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
APPLICATION OF SYMBOLIC PROCESSING TO COMMAND AND CONTROL: AN ADVANCED INFORMATION PRESENTATION SYSTEM. VOLUME 1: OVERVIEW Annual Technical Report, 1980 - 1981
Frank Zdybel, Jeff Gibbons, Norton Greenfeld, and Martin Yonke Aug. 1981 41 p refs
(Contract N00039-79-C-0316; ARPA Order 3740)
(AD-A106102; BBN-4752-Vol-1; ATR-2) Avail: NTIS HC A03/MF A01 CSCL 17/2

This report describes the work performed in the second year of the three-year contract to explore the application of symbolic processing to command and control (C2); specifically, the graphics interface between the C2 user and a complex C2 decision support system. In Volume 1, the goals and approaches used in the design of the prototype system, AIPS (Advanced Information Presentation System), are discussed, as well as the year's efforts to extend the prototype. An overview of the current AIPS system is also provided. GRA

N82-15285# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
APPLICATION OF SYMBOLIC PROCESSING TO COMMAND AND CONTROL: AN ADVANCED INFORMATION PRESENTATION SYSTEM. VOLUME 2: KNOWLEDGE BASE Annual Technical Report, 1980 - 1981
Frank Zdybel, Jeff Gibbons, Norton Greenfeld, and Martin Yonke Aug. 1981 181 p
(Contract N00039-79-C-0316; ARPA Order 3740)
(AD-A106103; BBN-4752-Vol-2; ATR-2) Avail: NTIS HC A09/MF A01 CSCL 17/2

This report describes the work performed in the second year of the three-year contract to explore the application of symbolic processing to command and control (C2); specifically, the graphics interface between the C2 user and a complex C2 decision support system. Volume 2 contains the complete AIPS knowledge base. This document provides the fully-inherited structure that the system sees during operation. GRA

N82-15286# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
APPLICATION OF SYMBOLIC PROCESSING TO COMMAND AND CONTROL: AN ADVANCED INFORMATION PRESENTATION SYSTEM. VOLUME 3: PROGRAM SOURCE FILES Annual Technical Report, 1980 - 1981
Frank Zdybel, Jeff Gibbons, Norton Greenfeld, and Martin Yonke Aug. 1981 206 p
(N00039-79-C-0316; ARPA Order 3740)
(AD-A106104; BBN-4752-Vol-3; ATR-2) Avail: NTIS HC A10/MF A01 CSCL 17/2

This report describes the work performed in the second year of the three-year contract to explore the application of symbolic processing to command and control (C2); specifically, the graphics interface between the C2 user and a complex C2 decision support system. Volume 3 contains the programs that manipulate the knowledge base and provide the active behavioral component of the system. GRA

N82-15287# California Univ., Livermore. Lawrence Livermore Lab.
ELECTROMAGNETIC LAUNCHER: A NEW WEAPON
A. L. Brooks and R. S. Hawke 10 Aug. 1981 10 p refs Presented at the 6th Intern. Symp. on Ballistics, Orlando, Fla., 22-24 Oct. 1981
(Contract W-7405-eng-48)
(DE81-029979; UCRL-85877; CONF-811033-1) Avail: NTIS HC A02/MF A01

There are several perceived advantages to using Electromagnetic (EM) launching for weapons applications. Higher muzzle velocities than can be achieved with conventional ordnance will minimize the projectile time-of-flight to the target; this is of particular interest for air-defense applications against maneuvering targets and for penetrator launching. The potential for precise current (hence acceleration) control promises lower peak accelerations that the projectile must withstand, and much more precise muzzle velocity control, permitting the use of smart projectiles and continuous zoning for artillery applications. The principles behind EM accelerators, particularly dc accelerators (railguns), the recent history of their development, their advantages for weapons applications, the general requirements, potential problem areas that must be faced by designers, and the work that has been done by researchers at Livermore and Los Alamos National Laboratories in accelerating 3-g projectiles to 10 km/s, and larger masses to lower velocities are discussed. DOE

N82-15288# Standard Elektrik Lorenz A.G., Stuttgart (West Germany). Fachbereich Nachrichtentechnik.
DIGITAL SPEECH TRANSMISSION AT LOW BITRATES Final Report
Manfred Immendoerfer, Dieter Kopp, and Sylvia Noigt Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 98 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-112; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,60

The performance of a linear prediction vocoder was tested by computer simulations and the selected algorithm was optimized concerning intelligibility and naturalness of the speech. For the purpose of realtime simulations of digital speech transmission systems a fast digital signal processor was developed using commercial available LSI components. The major components of the processor are a microprogram control unit, a 24 bit word length arithmetic - logic unit based on the AMD 2900 family - and a fast hardware multiplier unit capable of 5 million multiplications per second. The signal processor is interfaced to a host computer PDP 11, on which comfortable software development aids are available. A powerful operating system was developed for the signal processor itself to support and debug user software. Author

N82-15289# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Electronique et Physique.
FAULT DETECTION AND SURVEILLANCE FOR A LINK IN A DATA TRANSMISSION NETWORK Final Report [DETECTION DES PANNES ET SURVEILLANCE AU NIVEAU D'UN NOEUD D'UN RESEAU DE TRANSMISSION DE DONNEES]
Louis-Francois Pau 1 Nov. 1980 55 p refs In FRENCH
(Contract ATP-A-651-37-38)
(ENST-D-80010) Avail: NTIS HC A04/MF A01

Functional reliability of data communications networks, based on packet switching, at the level of the network links was studied. Fault diagnostic theory for systems in a nonbinary state was applied, necessitating adaptations due to the characteristics of protocols and link architectures. Results indicate that the packets can be considered as random test signals, intended to verify on line the proper functioning of the network links, channels, and protocols. It is indispensable to generate priority service packet series (test and surveillance packets) which gather at each link, and along the selected route, information on the state of the links and channels. Functional reliability is increased by local suboptimal control of traffic transitions. Author (ESA)

N82-15290# Universite Catholique de Louvain (Belgium). Lab. de Telecommunications et d'Hyperfrequences.
STUDY OF THE INFLUENCE OF PRECIPITATIONS AND CLOUDS ON THE PERFORMANCE OF SYNTHETIC APERTURE RADARS
A. Guissard and M. DeCoster Paris ESA Mar. 1981 199 p refs
(Contract ESTEC-4153/79/NL-PP(SC))
(ESA-CR(P)-1465) Avail: NTIS HC A09/MF A01

The principles of synthetic aperture radar (ASAR) are introduced, and the parameters (spatial resolution, image contrast, radiometric accuracy and resolution, and reduction in reflectivity dynamics) which describe SAR image quality are discussed in relation with ground reflectivity models. Attenuation depolarization and backscattering due to rain and clouds investigated through mathematical models. For incidence angles > 20 deg, copolarized reflectivity is lower than -5 db. Cross polarized reflectivity is always lower than copolarized. The difference > 5 db. Instrument threshold = -18 db. Image quality is best at the lowest frequency tested (53 GHz) and lowest incidence angle (20 deg from vertical). Ground reflectivity intensifies with frequency increase. Author (ESA)

N82-15291# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Nachrichtentechnik.
ESTIMATION OF THE PARAMETERS OF AN UNMODULATED CARRIER SIGNAL DISTURBED BY COMPLEX-MULTIPLICATIVE AND ADDITIVE GAUSSIAN NOISE Ph.D. Thesis - Technischen Univ.
Franz Edbauer Jun. 1981 144 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-737)
(DFVLR-FB-81-23) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 29,70

Estimation of the channel state and the parameters of a noisy unmodulated receiver input signal (pilot tone) is investigated for fast Rayleigh and Rician fading channels. The channel state is estimated by Kalman-filtering. Estimation of parameters, namely the frequency offset, the phase and the amplitude of the direct component at the time origin, the ratio of the power of the direct and the scattered component, and the fading bandwidth, is performed by maximum-likelihood-identification. This is applied to the design of a suboptimum phase locked loop, which makes use of the properties of the fading channel. Results are achieved analytically and by means of computer simulations. Author

N82-15292# Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
ELEMENTS FOR THE NUMERICAL ANALYSIS OF WAVE MOTION IN LAYERED MEDIA
John Lambros Tassoulas and Eduardo Kausel Feb. 1981 225 p refs
(Grant NSF ENG-79-08080)
(PB81-245268; MIT-CE-R81-2; NSF/CEE-81019) Avail: NTIS HC A10/MF A01 CSCL 08M

A technique for the numerical analysis of wave motion in layered media is developed. Semidiscrete particular solutions satisfying inhomogeneous boundary conditions are calculated by the finite element method. These solutions are combined with semidiscrete modes of an appropriate eigenvalue problem also

obtained by the finite element method. The boundary conditions corresponding to rigid and rough footings on a layered stratum are treated in detail. Applications are considered which illustrate the use of the technique developed. GRA

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N82-15293 Fernmeldetechnisches Zentralamt, Darmstadt (West Germany). Forschungsinst.

DERIVATIVE MEASUREMENT SYSTEM FOR CURRENT-VOLTAGE AND LIGHT-CURRENT-VOLTAGE CHARACTERISTICS [MESSUNG VC STROM-SPANNUNGS- UND LICHT-STROM-KENNLINIEN MIT HILFE DER ABLEITUNGSTECHNIK]

H. Burkhard Nov. 1980 35 p refs In GERMAN; ENGLISH summary

(FTZ-FI-512-TBr-6) Copyright. Avail: Issuing Activity

A modulation apparatus, based on derivative measurements of current voltage characteristics to investigate double heterostructure lasers was examined. Modulation at constant modulation index yields a direct measurement of I. dV/dI and in the same apparatus at the fundamental and first harmonic of the modulation frequency. The method makes pulsed measurements. Thermal influence due to ohmic losses in lser diodes are largely eliminated. Diodes are tested before mounting on a heat sink to make a preselection. The diode series resistance is measured including contact resistance, and a possible current dependence is shown. Author (ESA)

N82-15294 Technische Univ., Berlin (West Germany). Inst. fuer Mechanik.

INTRODUCTION TO THE CALCULATION OF PARAMETRICALLY EXCITED OSCILLATIONS [EINFUEHRUNG IN DIE BERECHNUNG PARAMETERERREGTER SCHWINGUNGEN]

Norbert Eicher 1981 427 p refs In GERMAN

(ISBN-3-7983-5150-3) Copyright. Avail: Issuing Activity

Linear and nonlinear oscillations are treated, including the general characteristics (linear homogeneous differential equations with periodic coefficients, Hill differential equation, homogeneous Mathieu differential equations, Mathieu functions). A successive approximation method for integrodifferential equations was used. Examples of oscillation differential equations and the stability of parametrically excited oscillations are shown. For clearness, the different influences are treated separately. Author (ESA)

N82-15295*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Electrical Engineering.

TOWARD THE ASSESSMENT OF THE SUSCEPTIBILITY OF A DIGITAL SYSTEM TO LIGHTNING UPSET Final Report

Joseph G. Tront, Werner Graf, Clyde F. Martin, Gerald M. Masson, John M. Myers, and James J. Whalen Dec. 1981 42 p refs (Grant NAG1-132)

Avail: NTIS HC A03/MF A01 CSCL 09C

Accomplishments and directions for further research aimed at developing methods for assessing a candidate design of an avionic computer with respect to susceptability to lightning upset are reported. Emphasis is on fault tolerant computers. Both lightning stress and shielding are covered in a review of the electromagnetic environment. Stress characterization, system characterization, upset detection, and positive and negative design features are considered. A first cut theory of comparing candidate designs is presented including tests of comparative susceptability as well as its analysis and simulation. An approach to lightning induced transient fault effects is included. A.R.H.

N82-15296*# Aerojet Electrosystems Co., Azusa, Calif.

GERMANIUM ACCUMULATION-MODE CHARGE-INJECTION-DEVICE PROCESS Final Report, Sep. 1980 - Jun. 1981

T. G. Moore Jun. 1981 40 p refs

(Contract NAS5-26318)

(NASA-CR-166754; Rept-7356) Avail: NTIS HC A03/MF A01 CSCL 09C

Gallium doped germanium is suitable for applications in the detection of far infrared radiation. Measurements were made on experimental photoconductors (PCs), accumulation mode charge injection devices (AMCIDs), and the SSPC (a switched, sampled PC alternative to the AMCID). The results indicate that the SSPC, which had a responsivity near 1.5 amp/watt, is desirable for use in two dimensional detector arrays. S.L.

N82-15297*# ITT Electro-Optical Products Div., Fort Wayne, Ind.

RUGGEDIZED ELECTRONOGRAPHIC TUBE DEVELOPMENT Final Project Report, Oct. 1979 - Oct. 1980

Scott Nevin Jan. 1981 23 p refs

(Contract NAS5-25877)

(NASA-CR-166762) Avail: NTIS HC A02/MF A01 CSCL 09A

Because of their glass components and lack of far ultraviolet sensitivity, currently available Spectracons are not suited for rocket launch. Technology developed for second generation image tubes and for magnetically focused image tubes can be applied to improve the optical and mechanical properties of these magnetically focused electronographic tubes whose 40 kilovolt signal electrons exit a 4-micrometer thick mica window and penetrate a photographic recording emulsion. A.R.H.

N82-15298# AEG-Telefunken, Frankfurt am Main (West Germany). Forschungsinst.

OPTICAL TRIGGERING OF POWER THYRISTORS (3) Final Report, Dec. 1979

Dieter Silber, Marius Fuellmann, Wolfgang Winter, Helmut Maeder, Werner Lukanz, and Franz Wilhelm Bonn Bundesministerium fuer Forschung und Technologie Apr. 1981 88 p refs in GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-071; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18,50

Light activated high voltage auxiliary thyristors were developed for blocking voltages until to 4 kV, and additionally suitable packages and optical coupling components. Turn-off times can be reduced without considerable deterioration of the trigger sensitivity. The integration of potential limiting diodes, Al-diffusion, compact device technology, and the problem of trigger delay times were also investigated. Author

N82-15299# Kieninger und Obergfell, St. Georgen (West Germany).

OPTIMIZING DEVELOPMENT OF A BIPOLAR STEPPING MOTOR WITH ELECTRONIC CIRCUIT FOR QUARTZ ANALOGUE CLOCKS Final Report, Oct. 1979

Erich Scheer Bonn Bundesministerium fuer Forschung und Technologie May 1981 31 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-077; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 6,50

Alternatives concerning stator assembly, stator material and rotor material in conjunction with drive are shown in accordance with the objective. The specifications for an integrated circuit are defined with regard to motor drive, also buzzer systems including drive were investigated for the optimum cost-performance ratio. Possibilities for a larger integration depth (hybrid assembly system) of IC and quartz crystal are discussed in view of automatic oscillator frequency alignment. T.M.

N82-15300# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente.

INTEGRATED FILTER FOR VIDEO COLOR PROCESSING Final Report, Nov. 1980

Horst Grobecker, Wolfgang Haussmann, Heinz-Peter Heller, and Rainer Lueder Bonn Bundesministerium fuer Forschung und Technologie May 1981 85 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-085; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17,85

Besides some analog integrated circuits, the PAL-color decoder of a color TV set consists of various filters. Some of them can be integrated with modern semiconductor technologies. The advantages are a reduction in costs and adjustment and an increased reliability and performance. A concept was developed which uses CCD filters for the PAL-comb-filter, the luminance-delay-line and the color trap. These filters were fabricated and their performance was proved by measurement and by simulation with video signals. A PAL-video-IC, which includes the demodulation, amplifying, matrix and controlling was designed. It is matched to the CCD-filters. Author

N82-15301# Institut fuer Festkoerpertechnologie, Munich (West Germany).
TOPOGRAPHY OF THE ELECTRICAL PROPERTIES OF THE SILICON/OXIDE INTERFACE AND THE INFLUENCE OF TECHNOLOGIC TREATMENTS Final Report, Sep. 1980
Helmut Bernt and Christoph Werner Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 123 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-066; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 25,85

Using the experience in automatic measurements of the parameters, turning point voltage, density of surface states and relaxation time of a MOS-capacitor the following methods were developed or improved by: simultaneous measurement of relaxation time and bulk lifetime at the same spot of a wafer; separation of the contributions to the relaxation time from bulk and surface generation; and automatic measurement of break down voltage and behavior under high voltage stress at room temperature. To explain the behavior of SiO2 layers under voltage-stress at normal and elevated temperature, additional measurements of fluctuations of the surface potential (caused by fixed oxide-charge) are presented. T.M.

N82-15302# Kernforschungszentrum, Karlsruhe (West Germany).
EDDY: A PROGRAM FOR CALCULATING THE BEHAVIOR OF ELECTROMAGNETS
B. Aldefeld (Philips Zentrallab. GmbH, Hamburg) and D. Steimer (Philips Zentrallab. GmbH, Hamburg) Sep. 1980 97 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(KfK-CAD-168; HH-PHI/103) Avail: NTIS HC A05/MF A01

The program EDDY can be used for calculating the static and dynamic behavior of electromagnets having rotationally symmetrical geometry. It is particularly suited for applications where the electromagnets are operated under pulse exitation and where the motion of an armature and its mechanical energy are of interest. Special attention is also given to the nonlinearity of magnetization curves of ferromagnetic materials and to the effects of eddy currents. The underlying numerical procedure is based on the diffusion equation for the electromagnetic field. The mathematical methods, the structure of the program, and practical applications are described. Author

N82-15303# Technische Hogeschool, Delft (Netherlands). Lab. voor Fiznmechanische Techniek.
ON THE EFFICIENCY OF SMALL AIR COIL MOTORS [OVER HET RENDEMENT VAN KLEINE LUCHTSPOELMOTOREN]
Paul Horowitz May 1981 134 p refs In DUTCH; ENGLISH summary
(WTHD-131) Avail: NTIS HC A07/MF A01

The efficiency of two types of small ironless motors in the output range of 5 to 500 mW was investigated for use in driving a miniature roller pump for a portable infusion system. One motor has a continuous rotating coil (commutator motor) and one has an oscillating coil. In this case a ratchet and ratchet wheel is needed to generate a rotating motion (ratchet wheel motor). The electromechanical transducer and a mechanical transformation and support system are discussed as well as frictional losses. The influence of the size of the motor is discussed. An expression for the total efficiency is obtained which enables the calculation of the speed of rotation of a certain motor at maximum efficiency for a certain required output. This optimal speed of rotation is hardly influenced by the required speed of rotation at the output shaft of the driving. The transmission, if required, has only a small effect on the optimum speed of rotation of the motor. A.R.H.

N82-15304# Fraunhofer-Inst. fuer Angewandte Festkoerperphysik, Freiburg (West Germany).
SEMICONDUCTOR TECHNOLOGY FOR VLSI: PLASMA ETCHING AND HIGH PRESSURE OXIDATION Final Report, Mar. 1980
Konrad Eisele Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 100 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-115; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,80

The large scale integration of electronic circuits on silicon requires etching of structures in the range of 1 micrometer or smaller. This cannot be achieved by wet chemical means. Dry etching processes, however, do produce an exact replica of the desired structure in those materials which are common in silicon planar technology. These procedures depend on the RF-energy, on how this is coupled to the substrate to be etched, and on the pressure. They are, accordingly, called plasma etching or reactive ion etching. Their etch rate and selectivity of the relevant materials for various gases was examined. MOS properties can be restored to their original level by annealing. The design of a practical etch reactor is outlined. T.M.

N82-15305# Siemens A.G., Munich (West Germany). Grundlagenentwicklung Material Physik.
ELECTRICAL SCREENING OF INTEGRATED CIRCUITS BY SEMI-INSULATING SILICON LAYERS Final Report, Nov. 1980
Heinz Mitlehner Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 83 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-134; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17,50

Insulating layers of high quality like SiO2 are a non-neglectable risk for the reliability of high voltage integrated circuits because these layers cannot completely screen the chip against external charges, especially in case of high resistive epitaxial layers surface charges. Deposition of semi-insulating amorphous silicon layers directly onto the crystal surface makes it possible to fully screen the chip with reproducible performance, and because of the high density of localized states in the amorphous silicon, external charges influence their countercharge in the layer itself. The properties of the various deposition methods (evaporation, glow-discharge, CVD) are compared and the decision for the evaporation is proved by the better interface properties. T.M.

N82-15306# Siemens A.G., Erlangen (West Germany). Fertigungstechnische Entwicklung.
ELECTROCHROMIC DISPLAYS Final Report, Jan. 1981
Helmut Freller, Hans Peter Lorenz, and Konrad Mund Bonn Bundesministerium fuer Foschung und Technologie Aug. 1981 37 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-141; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 7,80

Prototypes of large size displays with number sizes up to 190 mm were developed. To achieve this goal the evaporation technique for the electrochromic tungsten trioxide films, the display electrode pattern and the backwall electrode were adapted to the requirements. A sealing technique based on the use of silicon rubber was developed which allows use of the display-cells in a temperature region of -20 C to +80 C with leakage. By adding

1 - 3 percent water to the aprotic propylenecarbonate LiClO4 electrolyte, display performance was enhanced. For coloring and bleaching of the displays two driving circuits were developed which allow sequential counting. T.M.

N82-15307# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Bereich Neue Technologien.

DEVELOPMENT OF A THIN FILM PREPARATION TECHNIQUE FOR ZrO2(Y2O3) ELECTROLYTES ON POROUS SUPPORT STRUCTURES Final Report, Jun. 1980

Guenter Dietrich, Wolfgang Doenitz, Hajo Hermeking, Guenter Oehme, and Jochen Wahl Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 84 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-143; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17,65

An experimental study demonstrated that it is technologically feasible to deposit thin electrolyte layers of yttria-stabilized zirconia on porous substrates. Such structures were developed for application in high-temperature water vapor electrolysis. Thin film electrolytes were prepared by the electrochemical vapor deposition (EVD) technique. With this method, homogeneous, gas-tight layers of yttria-stabilized zirconia were prepared with a thickness of 20-50 micrometers. The thin film electrolytes show specific resistivities that are comparable to electrolyte sinters as applied in high-temperature water vapor electrolysis. T.M.

N82-15308# Stephan-Werke G.m.b.H. und Cie., Hameln (West Germany).

DESIGN OF A RELUCTANCE MOTOR WITH INCREASED EFFICIENCY AND POWER FACTOR FOR WIDESPREAD INDUSTRIAL APPLICATION Final Report, Jun. 1980

Peter Hansen-Goos and Walter Pieper Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 60 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-157; ISSN-0340-7608) Avail: NTIS HC A04/MF A01

The motors were designed in the range of 0.6-4 kW with 4-pole windings. An increase of nominal power by approximately 100%, and an increase of quality factor by approximately 50% are reported. The efficiency is equal to asynchronous motors of the same IEC size. T.M.

N82-15309# AEG-Telefunken, Berlin (West Germany). Fachbereich Sender.

IMPROVEMENT OF TETRODE POWER AMPLIFIER EFFICIENCY BY ADDING HARMONICS TO THE CARRIER OSCILLATION AND ENERGY SAVINGS RESULTING FROM VOLUME-DEPENDENT PULSE-DURATION MODULATION (PDM) CONTROL Final Report, Nov. 1980

Helmut Krebs, Dietmar Kroll, Manfred Lodahl, and Bodo Wysocki Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 94 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FT-T-81-163; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19,80

The method of improving efficiency by adding the 3rd harmonic to the carrier oscillation is common in triode power amplifiers. For a transfer of this technical method to modern high-power tetrodes, the circuitry for the generation of 3f current was fundamentally changed. A qualitative as well as quantitative description of the functioning is given with the aid of diagrams. The introduction of pulse-duration modulation into transmitter technology makes possible an economical application of a volume-dependent carrier control method. The method is distinguished for a special carrier control characteristic in relation to the saving of energy and for improved transmission performance achieved by use of a controlled clipper. T.M.

N82-15310# State Univ. of New York at Buffalo. Dept. of Chemistry.

DETERMINATION OF DIFFUSION COEFFICIENTS OF ANIONS AT A ROTATING SILVER DISC ELECTRODE

Kunio Shimizu and Robert A. Osteryoung 1 Sep. 1981 18 p refs

(Contract N00014-79-C-0682; NR Proj. 051-715)

(AD-A105828; TR-6) Avail: NTIS HC A02/MF A01 CSCL 09/1

A silver rotating disc electrode has been employed to obtain diffusion coefficients for a number of anions which form insoluble films at the electrode surface (sulfide, selenide, thiocyanate, selenocyanate, iodide and bromide) and one which does not (cyanide). It is found that the Levich equation is obeyed even though a film is continuously forming on the silver surface. Except for cyanide, the electrode reactions appear irreversible, based on the shape of the anodic voltammograms and the cathodic stripping peaks. GRA

N82-15311*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

PROCEEDINGS OF THE CONFERENCE ON HIGH-TEMPERATURE ELECTRONICS

1981 134 p refs Conf. held in Tucson, Ariz., 25-27 Mar. 1981 Sponsored by IEEE Industrial Electronics and Control Instrumentation Group, IEEE Solid State Circuits Council, DOE, NRC, NSF, LASL, and Arizona Univ.

(NASA-TM-84069; DE81-025058; CONF-810316) Avail: NTIS HC A07/MF A01 CSCL 09C

The development of electronic devices for use in high temperature environments is addressed. The instrumentational needs of planetary exploration, fossil and nuclear power reactors, turbine engine monitoring, and well logging are defined. Emphasis is place on the fabrication and performance of materials and semiconductor devices, circuits and systems and packaging. For individual titles, see N82-15312 through N82-15337.

N82-15312*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

HIGH TEMPERATURE ELECTRONICS APPLICATIONS IN SPACE EXPLORATION

R. F. Jurgens *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 3-7 refs (For primary document see N82-15311 06-33)

(Contract NAS7-100)

Avail: NTIS HC A07/MF A01 CSCL 09C

The extension of the range of operating temperatures of electronic components and systems for planetary exploration is examined. In particular, missions which utilize balloon-borne instruments to study the Venusian and Jovian atmospheres are discussed. Semiconductor development and devices including power sources, ultrastable oscillators, transmitters, antennas, electromechanical devices, and deployment systems are addressed. M.G.

N82-15313*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.

HIGH TEMPERATURE ELECTRONIC REQUIREMENTS IN AEROPROPULSION SYSTEMS

William C. Nieberding and J. Anthony Powell *In its* Proc. of The Conf. on High-Temp. Electron. 1981 p 13-16 refs (For primary document see N82-15311 06-33)

(E-708) Avail: NTIS HC A07/MF A01 CSCL 09C

The needs for high temperature electronic and electro-optic devices as they would be used on aircraft engines in either research and development applications, or operational applications are discussed. The conclusion reached is that the temperature at which the devices must be able to function is in the neighborhood of 500 to 600 C either for R&D or for operational applications. In R&D applications the devices must function in this temperature range when in the engine but only for a moderate period of time. On an operational engine, the reliability requirements dictate that the devices be able to be burned-in at temperatures significantly higher than those at which they will function on the engine. The major point made is that semiconductor technology must be pushed well beyond the level at which silicon will be able to function. M.G.

N82-15314*# Arizona Univ., Tucson. Dept. of Electrical Engineering.

PASSIVE COMPONENTS FOR HIGH TEMPERATURE OPERATION

L. S. Raymond, D. R. Clark, D. O. Black, D. J. Hamilton, and

W. Kerwin *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 21-23 Sponsored by DOE (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

The development of resistors, capacitors, and interconnect metalizations utilizing a low pressure chemical vapor deposition (LPCVD) process is described. The LPCVD process allows the passive components to be fabricated at temperatures higher than their highest operating temperatures. The deposition of thin films by LPCVD is accomplished by reacting one or more gases on the surface of a heated substrate. The substrates to be coated are placed on a graphite susceptor and then loaded into the center of a quartz reaction tube. The RF power is applied to the coil on the outside of the reaction tube which in turn is coupled into the graphite susceptor causing it to heat. Pressures of several torr or less are typical, with carrier flow rates of 0.1 to 2.0 liters/min. Nitrogen, hydrogen, and helium are typical carrier gases. These are controlled with mass flow controllers and the pressure is continuously monitored with a capacitive manometer. Materials selection and device testing are also discussed. M.G.

N82-15315*# Panelvision Corp., Pittsburgh, Pa.
DEVELOPMENT OF AN 1100 DEG F CAPACITOR
Robert E. Stapleton *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 25-28 ref Prepared in cooperation with Westinghouse Electric Corp., Pittsburgh, Pa. (For primary document see N82-15311 06-33)
(Contracts NAS3-6465; NAS3-10941)
Avail: NTIS HC A07/MF A01 CSCL 09C

The feasibility of developing a high temperature capacitor for 1100 F operation which is as small and light as conventional capacitors for normal operating temperatures is discussed. Pyrolyic boron nitride (PBN) was selected for the dielectric. The PBN capacitors were made by slicing and lapping material from thick blocks and then sputtering thin film electrodes. These capacitors had breakdown strengths of 7,000 volts per mil and a dissipation factor of less than 0.001 at 1100 F. Additional processing improvements were made after testing a multi-layer or stacked PBN capacitor for 1,000 hours at 1100 F. Sputter etching the wafers before depositing electrodes resulted in a reduction in dissipation factor. A sputtered boron nitride film applied to the outer electrode surfaces produced a more stable capacitor. A design for a 0.1 mu F capacitor and a summary of PBN wafer fabrication costs are given. M.G.

N82-15316*# Sandia Labs., Albuquerque, N. Mex.
HIGH-TEMPERATURE MEASUREMENTS OF Q-FACTOR IN ROTATED X-CUT QUARTZ RESONATORS
I. J. Fritz *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 29-31 refs (For primary document see N82-15311 06-33)
(Contract DE-AC04-76DP-00789)
Avail: NTIS HC A07/MF A01 CSCL 09C

The Q-factors of piezoelectric resonators fabricated from natural and synthetic quartz with a 34 deg rotated X-cut orientation were measured at temperatures up to 325 C. The synthetic material, which was purified by electrolysis, retains a higher enough Q to be suitable for high temperature pressure-transducer applications, whereas the natural quartz is excessively lossy above 200 C for this application. The results are compared to results obtained previously at AT-cut resonators. M.G.

N82-15317*# Naval Research Lab., Washington, D. C.
ASSESSMENT OF HIGH TEMPERATURE METALLIZATIONS FOR I(2)L AND CMOS TECHNOLOGIES
A. Christou and B. R. Wilkins *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 33-34 refs (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

High temperature barrier metallizations were assessed and tested for I(2)L and CMOS applications. Life tests were accelerated to 375 C in view of the -55 C to +300 C temperature range established for engine-located electronics without fuel cooling. The gold-refractory metallizations evaluated were Au-TiW-PtSi, Au-TiW/TiO2/TiW-PtSi and Au-TiW(N)-PtSi. These metallization systems were thermally annealed to at least 375 C for up to 250 hours. The critical requirement for stable diffusion barrier is the TiW grain size. Small grain (250A-500A) films were observed to be stable up to 375 C. Deposition to TiW diffusion barrier in the presence of oxygen and nitrogen also results in an effective diffusion barrier. Auger electron spectroscopy profiles of the PtSi indicates some penetration by the TiW. In the case of PtSi/TiW interface, the redistribution of oxygen further passivates the system by forming a TiO2 layer at the interface. M.G.

N82-15318*# Wisconsin Univ. - Madison. Dept. of ECE.
AMORPHOUS METALLIZATIONS FOR HIGH-TEMPERATURE SEMICONDUCTOR DEVICE APPLICATIONS
J. D. Wiley, J. H. Perepezko, J. E. Nordman, and Guo Kang-Jin (Chinese Academy of Sciences, Shanghai) *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 35-37 refs (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

The initial results of work on a class of semiconductor metallizations which appear to hold promise as primary metallizations and diffusion barriers for high temperature device applications are presented. These metallizations consist of sputter-deposited films of high T sub g amorphous-metal alloys which (primarily because of the absence of grain boundaries) exhibit exceptionally good corrosion-resistance and low diffusion coefficients. Amorphous films of the alloys Ni-Nb, Ni-Mo, W-Si, and Mo-Si were deposited on Si, GaAs, GaP, and various insulating substrates. The films adhere extremely well to the substrates and remain amorphous during thermal cycling to at least 500 C. Rutherford backscattering and Auger electron spectroscopy measurements indicate atomic diffussivities in the 10 to the -19th power sq cm/S range at 450 C. M.G.

N82-15319*# Naval Research Lab., Washington, D. C.
OHMIC CONTACTS TO GaAs FOR HIGH-TEMPERATURE DEVICE APPLICATIONS
W. T. Anderson, Jr., A. Christou, J. F. Giuliani, and H. B. Dietrich *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 39-42 refs (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

Ohmic contacts to n-type GaAs were developed for high temperature device applications up to 300 C. Refractory metallizations were used with epitaxial Ge layers to form the contacts: TiW/Ge/GaAs, Ta/Ge/GaAs, Mo/Ge/GaAs, and Ni/Ge/GaAs. Contacts with high dose Si or Se ion implantation of the Ge/GaAs interface were also investigated. The contacts were fabricated on epitaxial GaAs layer grown on N+ or semi-insulating GaAs substrates. Ohmic contact was formed by both thermal annealing (at temperatures up to 700 C) and laser annealing (pulsed Ruby). Examination of the Ge/GaAs interface revealed Ge migration into GaAs to form an N+ doping layer. The specific contact resistances of specimens annealed by both methods are given. M.G.

N82-15320*# Texas Instruments, Inc., Dallas.
FABRICATION AND HIGH TEMPERATURE CHARACTERISTICS OF ION-IMPLANTED GaAs BIPOLAR TRANSISTORS AND RING-OSCILLATORS
F. H. Doerbeck, H. T. Yuan, and W. V. McLevige *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 45-48 refs (For primary document see N82-15311 06-33)
(Contract N00014-80-C-0936)
Avail: NTIS HC A07/MF A01 CSCL 09C

Ion implantation techniques that permit the reproducible fabrication of bipolar GaAs integrated circuits are studied. A 15 stage ring oscillator and discrete transistor were characterized between 25 and 400 C. The current gain of the transistor was found to increase slightly with temperature. The diode leakage currents increase with an activation energy of approximately 1 eV and dominate the transistor leakage current 1 sub CEO above 200 C. Present devices fail catastrophically at about 400 C because of Au-metallization. R.J.F.

N82-15321*# Los Alamos Scientific Lab., N. Mex.
DEVELOPMENT OF INTEGRATED THERMIONIC CIRCUITS FOR HIGH-TEMPERATURE APPLICATIONS

J. Byron McCormick, Dale Wilde, Stephen Depp (IBM Research, San Jose, Calif.), Douglas J. Hamilton (Arizona Univ., Tucson), William Kerwin (Arizona Univ., Tucson), Charles Derouin, Lorenzo Roybal, and Richard Wooley *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 49-53 Sponsored by DOE (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

Integrated thermionic circuits (ITC) capable of extended operation in ambient temperatures up to 500 C are studied. A set of practical design and performance equations is demonstrated. Experimental results are discussed in which both devices and simple circuits were successfully operated in 5000 C environments for extended periods. It is suggested that ITC's may become an important technology for high temperature instrumentation and control systems in geothermal and other high temperature environments. R.J.F.

N82-15322*# Sandia Labs., Albuquerque, N. Mex.
GALLIUM PHOSPHIDE HIGH TEMPERATURE DIODES
R. J. Chaffin and L. R. Dawson *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 55-57 refs (For primary document see N82-15311 06-33)
(Contract DE-AC04-76DP-00789)
Avail: NTIS HC A07/MF A01 CSCL 09C

High temperature (300 C) diodes for geothermal and other energy applications were developed. A comparison of reverse leakage currents of Si, GaAs, and GaP was made. Diodes made from GaP should be usable to 500 C. A Liquid Phase Epitaxy (LPE) process for producing high quality, grown junction GaP diodes is described. This process uses low vapor pressure Mg as a dopant which allows multiple boat growth in the same LPE run. These LPE wafers were cut into die and metallized to make the diodes. These diodes produce leakage currents below ten to the -9th power A/sq cm at 400 C while exhibiting good high temperature rectification characteristics. High temperature life test data is presented which shows exceptional stability of the V-I characteristics. R.J.F.

N82-15323*# Sandia Labs., Albuquerque, N. Mex.
A GALLIUM PHOSPHIDE HIGH-TEMPERATURE BIPOLAR JUNCTION TRANSISTOR
T. E. Zipperian, L. R. Dawson, and R. J. Chaffin *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 59-61 refs (For primary document see N82-15311 06-33)
(Contract DE-AC04-76DP-00789)
Avail: NTIS HC A07/MF A01 CSCL 09C

Preliminary results are reported on the development of a high temperature (350 C) gallium phosphide bipolar junction transistor (BJT) for geothermal and other energy applications. This four-layer p(+)n(-)pp(+) structure was formed by liquid phase epitaxy using a supercooling technique to insure uniform nucleation of the thin layers. Magnesium was used as the p-type dopant to avoid excessive out-diffusion into the lightly doped base. By appropriate choice of electrodes, the device may also be driven as an n-channel junction field-effect transistor. The initial design suffers from a series resistance problem which limits the transistor's usefulness at high temperatures. R.J.F.

N82-15324*# Texas Technological Univ., Lubbock. Dept. of Electrical Engineering.
RELIABILITY STUDY OF REFRACTORY GATE GALLIUM ARSENIDE MESFETS
John C. W. Yin and William M. Portnoy *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 63-65 refs (For primary document see N82-15311 06-33)
(Contract N00014-78-C-0738)
Avail: NTIS HC A07/MF A01 CSCL 09C

Refractory gate MESFET's were fabricated as an alternative to aluminum gate devices, which have been found to be unreliable as RF power amplifiers. In order to determine the reliability of the new structures, statistics of failure and information about mechanisms of failure in refractory gate MESFET's are given. Test transistors were stressed under conditions of high temperature and forward gate current to enhance failure. Results of work at 150 C and 275 C are reported. R.J.F.

N82-15325*# RCA Research Labs., Tokyo (Japan).
ELECTRICAL SWITCHING IN CADMIUM BORACITE SINGLE CRYSTALS
Tatsuo Takahashi and Osamu Yamada *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 67-70 refs (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

Cadmium boracite single crystals at high temperatures (> 300 C) were found to exhibit a reversible electric field-induced transition between a highly insulative and a conductive state. The switching threshold is smaller than a few volts for an electrode spacing of a few tenth of a millimeter corresponding to an electric field of 100 to 1000 V/cm. This is much smaller than the dielectric break-down field for an insulator such as boracite. The insulative state reappears after voltage removal. A pulse technique revealed two different types of switching. Unstable switching occurs when the pulse voltage slightly exceeds the switching threshold and is characterized by a pre-switching delay and also a residual current after voltage pulse removal. A stable type of switching occurs when the voltage becomes sufficiently high. Possible device applications of this switching phenomenon are discussed. R.J.F.

N82-15326*# Westinghouse Electric Corp., Pittsburgh, Pa.
WHATEVER HAPPENED TO SILICON CARBIDE
R. B. Campbell *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 71-76 refs (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

The progress made in silicon carbide semiconductor devices in the 1955 to 1975 time frame is examined and reasons are given for the present lack of interest in the material. Its physical and chemical properties and methods of preparation are discussed. Fabrication techniques and the characteristics of silicon carbide devices are reviewed. It is concluded that a combination of economic factors and the lack of progress in fabrication techniques leaves no viable market for SiC devices in the near future. R.J.F.

N82-15327*# Burr-Brown Research Corp., Tucson, Ariz.
MINUS 55 TO PLUS 200 DEG C 12 BIT ANALOG-TO-DIGITAL CONVERTER
Lewis R. Smith and Paul R. Prazak *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 77-79 refs (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

A 12 bit successive approximation analog to digital converter that offers moderately high speed precision data conversion at a reasonable level of cost and complexity is studied. The ADCH10HT extends this capability over a temperature range of -55 to +200 C. No missing-code performance is maintained over the entire temperature range. The converter is completely self-contained with internal clock and +10 volt reference. The CMOS devices offer low power dissipation, so that the internal temperature of the hybrid circuit does not rise as much from self heating. In CMOS circuits, pn junction leakage currents are returned to the supplies so that the logic keeps working at temperatures up to 250 C. R.J.F.

N82-15328*# Harris Semiconductor, Melbourne, Fla.
PROCESS CHARACTERISTICS AND DESIGN METHODS FOR A 300 DEG QUAD OP AMP
J. D. Beasom and R. B. Patterson, III *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 81-84 ref Sponsored by Sandia National Lab., Albuquerque, N. Mex. (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

The results of process characterization, circuit design, and reliability studies for the development of a quad OP amplifier intended for use up to 300 C are presented. A dielectrically isolated complementary vertical bipolar process was chosen to fabricate the amplifier in order to eliminate isolation leakage and the possibility of latch up. Characterization of NPN and PNP junctions showed them to be suitable for use up to 300 C. Interconnect reliability was predicted to be greater than four years mean time between failure. Parasitic MOS formation was eliminated by isolation of each device. R.J.F.

N82-15329*# Micro Networks Corp., Worcester, Mass.
HYBRID A/D CONVERTER FOR 200 DEG C OPERATION
Mark R. Sullivan and Jeffrey B. Toth *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 85-88 refs (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

A 12 bit A/D converter was designed and developed which will operate at 200 C with .05 linearity, 1/accuracy, 350 WSec conversion time, and only 455 mW power consumption. This product also necessitated the development of a unique three metal system in which aluminum wire bonding is done utilizing aluminum bonding pads, gold wire bonding to all gold areas, and employment of a nickel interface between gold and aluminum connections. This system totally eliminates the formation of a intermetallics at the bonding interface which can lead to bond failure. This product represents an advancement in electronics as it proved the operation of integrated circuits at high temperature, as well as providing information about both the electrical and mechanical reliability of hybrid circuits at 200 C. B.W.

N82-15330*# Oak Ridge National Lab., Tenn.
WIRELESS, IN-VESSEL NEUTRON MONITOR FOR INITIAL CORE-LOADING OF ADVANCED BREEDER REACTORS
J. T. DeLorenzo, E. J. Kennedy (Tennessee Univ., Knoxville), T. V. Blalock (Tennessee Univ., Knoxville), J. M. Rochelle, M. M. Chiles, and K. H. Valentine *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 89-92 refs (For primary document see N82-15311 06-33)
(Contract W-7405-eng-26)
Avail: NTIS HC A07/MF A01 CSCL 09C

An experimental wireless, in-vessel neutron monitor was developed to measure the reactivity of an advanced breeder reactor as the core is loaded for the first time to preclude an accidental critically incident. The environment is liquid sodium at a temperature of approx. 220 C, with negligible gamma or neutron radiation. With ultrasonic transmission of neutron data, no fundamental limitation was observed after tests at 230 C for > 2000 h. The neutron sensitivity was approx. 1 count/s-nv, and the potential data transmission rate was approx. 10,000 counts/s. B.W.

N82-15331*# Sandia Labs., Albuquerque, N. Mex.
SOLID STATE MICROELECTRONICS TOLERANT TO RADIATION AND HIGH TEMPERATURE
Bruce L. Draper and David W. Palmer *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 93-96 refs (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

The 300 C electronics technology based on JFET thick film hybrids was tested up to 10 to the 9th power rad gamma (Si) and 10 to the 15th power neutrons/sq cm. Circuits and individual components from this technology all survived this total dose although some devices required 1 hour of annealing at 200 or 300 C to regain functionality. This technology used with real time annealing should function to levels greater than 10 to the 10th power rad gamma and 10 to the 16th power n/sq cm. B.W.

N82-15332*# General Electric Co., Syracuse, N.Y. Electronics Lab.
HIGH TEMPERATURE LSI
D. C. Dening, L. J. Ragonese, and C. Y. Lee *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1982 p 97-100 refs (For primary document see N82-15311 06-33)
(Contract N00173-79-C-0010)
Avail: NTIS HC A07/MF A01 CSCL 09C

Integrated injection logic (1,2) technology for reliable operation under a -55 C to +300 C, temperature range is discussed. Experimental measurements indicate that an 80 mv signal swing is available at 300 C with 100 micro A injection current per gate. In addition, modeling results predict how large gate fan-ins can decrease the maximum thermal operational limits. These operational limits and the longterm reliability factors associated with device metallization are evaluated via specialized test mask. B.W.

N82-15333*# Sandia Labs., Albuquerque, N. Mex.
HIGH-TEMPERATURE COMPLEMENTARY METAL OXIDE SEMICONDUCTORS (CMOS)
John D. McBrayer *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron 1981 p 101-104 refs (For primary document see N82-15311 06-33)
(SAND-81-0345C) Avail: NTIS HC A07/MF A01 CSCL 09C

The results of an investigation into the possibility of using complementary metal oxide semiconductor (CMOS) technology for high temperature electronics are presented. A CMOS test chip was specifically developed as the test bed. This test chip incorporates CMOS transistors that have no gate protection diodes; these diodes are the major cause of leakage in commercial devices. B.W.

N82-15334*# Laboratoires de Marcoussis (France). Electrochemistry Dept.
A PRESENTLY AVAILABLE ENERGY SUPPLY FOR HIGH TEMPERATURE ENVIRONMENT (550-1000 DEG F)
J. Jacquelin and R. L. Vic *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 107-109 (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

Sodium-sulfur cells attractive electric energy storage device for long service, are discussed. The state of art is given. More than 200 Wh/kg cells were tested. The known range of working temperature is 550 to 750 F. Self-discharge is quite nonexistent for months in operation. The technical basis for expecting an operating range up to 1,000 F under a high pressure atmosphere is given. Possibilities to adapt size and characteristics to particular interplanetary missions are discussed. B.W.

N82-15335*# General Electric Co., Syracuse, N.Y.
STUFFED Mo LAYER AS A DIFFUSION BARRIER IN METALLIZATIONS FOR HIGH TEMPERATURE ELECTRONICS
John K. Boah, Virginia Russell, and David P. Smith *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 111-114 refs (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

Auger electron spectroscopy was employed to characterize the diffusion barrier properties of molybdenum in the CrSi2/Mo/Au metallization system. The barrier action of Mo was demonstrated to persist even after 2000 hours annealing time at 300 C in a nitrogen ambient. At 340 C annealing temperature, however, rapid interdiffusion was observed to have occurred between the various metal layers after only 261 hours. The presence of controlled amounts of oxygen in the Mo layer is believed to be responsible for suppressing the short circuit interdiffusion between the thin film layers. Above 340 C, its is believed that the increase in the oxygen mobility led to deterioration of its stuffing action, resulting in the rapid interdiffusion of the thin film layers along grain boundaries. B.W.

N82-15336*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PACKAGING TECHNIQUES FOR LOW-ALTITUDE VENUS BALLOONS BEACON
Thomas J. Borden and John W. Winslow *In* NASA. Lewis Research Center Proc. of the Conf. on High Temp. Electron. 1981 p 117-121 (For primary document see N82-15311 06-33)
(Contract NAS7-100)
Avail: NTIS HC A07/MF A01 CSCL 09C

The results of a specific design project for the Venus balloon beacon, in which a microwave beacon is required to operate for a limited time at high temperature (350 C) and at high pressure, (10 bars). In a chemically hostile environment after surviving large mechanical shock forces (up to 280 gs) are discussed. It was found that many existing, commercially-available component can be used in such a design with only minor modifications. A further result is that a crude (and consequently low-cost) test program can be designed to identify and select promising commercial components. B.W.

N82-15337*# Permaluster, Inc., Burbank, Calif.
HIGH TEMPERATURE (Al_2O_3) INSULATION AND LIGHT WEIGHT CONDUCTORS

Henry Walker *In* NASA. Lewis Research Center Proc. of the Conf. on High-Temp. Electron. 1981 p 123-219 (For primary document see N82-15311 06-33)
Avail: NTIS HC A07/MF A01 CSCL 09C

The of an aluminum conductor with an aluminum oxide insulation film was investigated. Aluminum oxide insulated wire or strip (with a melting point of 2050 C) is unique for applications in the electronic, missile, atomic reactor, aerospace, and aircraft industries. The oxide film is highly flexible, suitable for all windings of any size and shape of coil (magnetic). Briefly touched upon are the ultraviolet, proton gamma radiation uses, as well as high vacuum and cryogenic applications. Since the film is inorganic and chemically inert, it does not age or deteriorate in storage and has good dielectric properties (1000 volts per mil). B.W.

N82-15338# Brookhaven National Lab., Upton, N. Y.
IMPROVED TECHNIQUE TO MEASURE ELECTRONICALLY AC LOSSES IN SUPERCONDUCTING CABLES
F. Schauer and M. Meth 1981 8 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10-14 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-029323; BNL-29932; CONF-810835-15) Avail: NTIS HC A02/MF A01

An improved electronic method for measuring ac losses in superconducting cables of lengths from 1m to 10m was developed. This method compensates for phase shifts in the measuring circuit elements and for imbalance of the difference amplifier due to changes in the common mode voltage. This measuring method is being further improved and adapted to the loss measurements of a 138V, 4 kA, 100 m long superconducting cable under construction. DOE

N82-15339# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Systems Technology Div.
COMPONENT OUTAGE DATA ANALYSIS METHODS. VOLUME 1: OVERVIEW AND SPECIAL APPLICATIONS Final Report
J. A. Marshall, M. Mazumdar, and D. A. McCutchan Aug. 1981 219 p refs Sponsored by Electric Power Research Institute 2 Vol.
(EPRI Proj. 1468-1)
(DE81-904214; EPRI-EL-1980-Vol-1) Avail: NTIS HC A10/MF A01

Methods for improving the quality of outage statistics for power equipment are addressed. Statistical techniques were evaluated and applied to utility outage data to illustrate their use. Fitting distributions is discussed for interval estimation and verifying models of equipment failure and repair. Precision is gained by pooling data across similar experience/equipment categories; methods are demonstrated for testing data samples to be pooled. Similarly, use of regression analysis to uncover relationships and integrate information from dissimilar samples is illustrated. Errors in modeling equipment performance, e.g., neglecting dependences, are discussed and model verification by simulation is shown to be a powerful tool. Emphasis is given to infrequent events and small data samples; Bayesian analysis and model simplification (reducing the number of parameters estimated) are examined as remedies to data sparsity. DOE

N82-15340# Westinghouse Electric Corp., Pittsburgh, Pa. Advanced Systems Technology Div.
COMPONENT OUTAGE DATA ANALYSIS METHODS. VOLUME 2: BASIC STATISTICAL METHODS Final Report
J. A. Marshall, M. Mazumdar, and D. A. McCutchan Aug. 1981 130 p refs Sponsored by Electric Power Reseach Inst. 2 Vol.
(EPRI Proj. 1468-1)
(DE81-904197; EPRI-EL-1980-Vol-2) Avail: NTIS HC A07/MF A01

Statistical methods for analyzing outage data on major power system components such as generating units, transmission lines, and transformers are identified. The analysis methods produce outage statistics from component failure and repair data that help in understanding the failure causes and failure modes of various types of components. Methods for forecasting outage statistics for those components used in the evaluation of system reliability are emphasized. DOE

N82-15341# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
SUPERCONDUCTING CRITICAL CURRENT DENSITY AS A PROBE OF DEFECTS IN METALLIC GLASSES
C. C. Koch, J. O. Scarbrough, and D. M. Kreeger 1981 4 p refs Presented at the 4th Intern. Conf. on Rapidly Quenched Metals, Sendai, Japan, 24 Aug. 1981
(Contract W-7405-eng-26)
(DE81-028138; CONF-810851-1) Avail: NTIS HC A02/MF A01

The influence of cold rolling on the critical current density in amorphous (Mo sub o sub 6 RU sub o sub 4)sub 82 B sub 18 is reported. Furthermore, more extensive characterization of the samples by transmission electron microscopy, scanning electron microscopy, and small angle X-ray scattering is presented. DOE

N82-15342# California Univ., Livermore. Lawrence Livermore Lab.
PERFORMANCE AND COST ANALYSIS OF LARGE CAPACITOR BANKS USING WEIBULL STATISTICS AND MTBF
B. T. Merritt and K. Whitham 1 Jun. 1981 5 p refs Presented at the 3rd IEEE Intern. Pulsed Power Conf. Albuquerque, N. Mex., 1-3 Jun. 1981
(Contract W-7405-eng-48)
(DE81-024364; UCRL-85723; CONF-810659-21) Avail: NTIS HC A02/MF A01

Inertial confinement fusion projects have required increasingly larger capacitor banks. As bank size has increased, the need for high energy density capacitors has become apparent. Higher energy densities are achieved by increasing the dielectric stress while reducing life. Acceptable capacitor life is based on system mean time between failure (MTBF) for Nova, a 100 shot MTBF was deemed to be minimum. For a large population of capacitors, as in Nova, statistical analysis is required to evaluate system performance. The tradeoff between capacitor life and energy density can be characterized via Weibull statistics. A method of calculating capacitor bank reliability and capacitor bank costs based on Weibull statistics is given herein. DOE

N82-15343# Oak Ridge National Lab., Tenn.
DEVELOPMENT OF FORCE-COOLED SUPERCONDUCTORS FOR USE IN LARGE MAGNETS
J. R. Miller 1981 12 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10 Aug. 1981
(Contract W-7405-eng-26)
(DE81-028067; CONF-810835-8) Avail: NTIS HC A02/MF A01

Force-cooled conductors of ICSs offer an attractive option for designers of large magnets. Knowledge of the performance of this type of conductor has advanced sufficiently in recent years for reliable designs to be made. Preliminary designs can be made with the help of relatively simple formulae and a rather extensive data base from small conductor tests. DOE

N82-15344# Brookhaven National Lab., Upton, N. Y. Div. of Metallurgy and Mater. Sci.
SUPERCONDUCTING CURRENT DENSITIES IN BRONZE-PROCESSED Nb_3Sn MULTIFILAMENTARY WIRES
S. Okuda (Sumitomo Electric Industry, Osaka), M. Suenaga, and T. S. Luhman 1981 11 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030566; BNL-30018; CONF-810835-28) Avail: NTIS HC A02/MF A01

The superconducting current densities of five multifilamentary wires with diameters of 0.41 mm and different ratios of bronze to Nb (R = 2 to 3.7) were measured. The superconducting critical currents were measured at 4.2 K in magnetic fields of 8 to 19 T. Effects of heat treatments were investigated. DOE

N82-15345# Minnesota Power and Light Co., Duluth.
INVESTIGATION OF GEOMAGNETICALLY INDUCED CURRENTS IN THE PROPOSED WINNIPEG-DULUTH-TWIN CITIES 500-kV TRANSMISSION LINE Final Report
J. G. Kappenman, V. D. Albertson (Minnesota Univ., Minneapolis), and N. Mohan (Minnesota Univ., Minneapolis) Jul. 1981

169 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1205-1)
(DE81-904233; EPRI-EL-1949) Avail: NTIS HC A08/MF A01

The effects of geomagnetically induced currents (GIC) on a new 749 km (466 mile) 500 kV ac transmission line from the vicinities of Winnipeg, Manitoba to Duluth, Minnesota to Minneapolis-St. Paul, Minnesota are investigated. The effects on the operation of the 500 kV line, equipment connected directly to the line, and effects on the power systems connected to the line are studied. The study covers the instrumentation to measure and record geomagnetic field fluctuatons, Earth surface potential, and GIC; the analytical determination of GIC throughout the system; the determination of increased transformer reactive power requirements under conditions of half cycle saturations; interconnected power system load-flow studies in the presence of GIC; switching transients on the 500 kV line and harmonic studies of the 500 kV autotransformers in the presence of GIC; the effects of GIC on current transformers and relays; and, effects of harmonics due to GIC on high voltage dc converter station operation. DOE

N82-15346# California Univ., Berkeley. Lawrence Berkeley Lab. Physics, Computer Science and Mathematics Div.
GAS COOLED ELECTRICAL LEADS FOR USE ON FORCED COOLED SUPERCONDUCTING MAGNETS
R. G. Smits, P. L. Andrews, W. A. Burns, C. T. Day, J. W. Gary, G. H. Gibson, M. A. Green, M. Pripstein, R. R. Ross, and J. D. Taylor Aug. 1981 9 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10-14 Aug. 1981
(Contract W-7405-eng-48)
(DE81-029855; LBL-12783; CONF-810835-18) Avail: NTIS HC A02/MF A01

The fabrication and testing of a pair of single tube leads which carry one fifth of the time projection chamber (TPC) magnet current is described. Since one of the TPC magnet leads is horizontal within the vacuum chamber, the test leads were tested in a near horizontal position. The performance of the composite TPC magnet lead or the performance of other leads built with multiple tube bundles can be predicted. DOE

N82-15347# Sandia Labs., Albuquerque, N. Mex.
HIGH VOLTAGE, MAGNETICALLY SWITCHED PULSED POWER SYSTEMS
J. P. VanDevender and R. A. Reber 1981 12 p refs Presented at the 3rd IEEE Intern. Pulsed Power Conf., Albuquerque, N.Mex., 1 Jun. 1981
(Contract DE-AC04-76DP-00789)
(DE81-026290; SAND-81-0754C; CONF-810659-28) Avail: NTIS HC A02/MF A01

The principles of magnetic switching are briefly described. Experiments on material properties and their relation to switch performance, risetime limitations, and core insulation are described. Magnetic switching is evaluated from a system perspective. An idealized pulse power system with 200 kJ or stored energy and a 40 ns output pulse is examined. The multi-megavolt electrical insulation requirements impose limitations on the switches. The cost of the magnetically switched system exceeds the cost of the conventional superpower generator system by up to 75%. The potential for reliability, reproducibility, and repetitive pulse capability must be evaluated for each application to offset the increased cost. DOE

N82-15348# Siemens A.G., Munich (West Germany). Werk fuer Integrierte Schaltungen.
COMPUTER AIDS FOR CIRCUITS DESIGNS Final Report, Apr. 1980
Adolf Pascher, Istvan Madas, and Michael Mirbeth Bonn Bundesministerium fuer Forschung und Technologie Dec. 1980 72 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-80-185; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 15,15

Suitable simple and reliable computer aided circuit design methods for measuring data and processing model parameters were developed for integrated circuit design engineers. Test chips were modified in order to register the relevant measured data for different technologies. The measuring methods were improved in order to obtain more accurate and more reproducible data for the measuring programs and the computer. Device and process simulation programs were developed for models for bipolar and metal oxide semiconductor (MOS) transistors in order to determine model parameters. Author (ESA)

N82-15349# AEG-Telefunken, Frankfurt am Main (West Germany). Fachbereich Leistungshalbleiter.
CONTROL OF THE MINORITY CARRIER LIFETIME OF SILICON DEVICES USING ELECTRON IRRADIATION Final Report, Jul. 1980
Edgar Borchet, Joachim Dziewior, Dieter Silber, and Alois Sonntag Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 94 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-037; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19,80

The turn off time (tq) of thyristors was lowered approximately 50% by electron irradiation of local sites on the devices. The on state voltage (VT) and the blocking characteristics (VR, VD) are not degraded whereas the turn-on power loss increases. Decreasing the lifetime in silicon power devices by high energy electron irradiation (12 and 15 MeV) of the total device area gives better data trade-off (VT - tq - VR, VD) as compared with gold diffusion. The thermal stability of the radiation induced recombination centers is, however, relatively low when the devices are annealed at 200 C for periods of 100 to 1000 hr.
Author (ESA)

N82-15350# Semikron Gesellschaft fuer Gleichrichterbau und Elektronik m.b.H., Nuremberg (West Germany).
ELECTRON IRRADIATION OF SEMICONDUCTOR DEVICES Final Report, Dec. 1979
Hansjuergen Fuchs, Reinhard Grube, Werner Tursky, and Joachim Knopp Bonn Bundesministerium fuer Froschung und Technologie Feb. 1981 76 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-045; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16

Electron beam irradiation technology, applied for modeling of electrical semiconductor device parameters, was investigated, especially for producing fast switching devices with high blocking capability. Applicability of this method to local carrier lifetime adjustment was also studied. For adjusting the switching times of semiconductor devices, electron beam irradiation surpasses gold diffusion considerably as far as expenditure, accuracy and reproducibility are concerned. The ratio of on-state voltage to turn-off time which is inferior in comparison to gold diffusion be improved by adapting the device dimensions carrier lifetime was proved. Equipment and methods for series production were developed and tested with pilot production quantities. The basis for introducing this technology into production is now available.
Author (ESA)

N82-15351# Leitz (Ernst) G.m.b.H., Wetzlar (West Germany). Ressort Entwicklung.
COMPONENTS FOR MASK TECHNOLOGY Final Report, Oct. 1979
Hans-Dieter Jacoby Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 40 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-055; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8.40

The production of photomasks is considered in three areas: (1) development of a wide angle projection lens, 10 : 1; (2) development of a comparator based on laser interferometry and capable of automatic measurement of masks; and (3) creation of software systems for meteorology applications in two of three dimensions as well as in polar coordinates, with automated measuring equipment adapted to different computer systems. Examples illustrate the capabilities of software aided meteorology. Author (ESA)

N82-15352# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. Electronique et Physique.
CHARACTERIZATION OF GaAs SUPERHIGH FREQUENCY FIELD EFFECT POWER TRANSISTORS IN THE NONLINEAR MODE Ph.D. Thesis [CARACTERISATION DES TRANSISTORS A EFFET DE CHAMP GAAS HYPERFREQUENCE DE PUISSANCE EN REGIME NON LINEAIRE]
Michel Goudelis May 1981 234 p refs In FRENCH
(ENST-E-81001) Avail: NTIS HC A11/MF A01

Different characterization methods for FET's are examined. Taking the variation of large signal parameters and a small signal model, equivalent circuit elements which have nonlinear behavior are sought while the variation in these elements is linked with voltage variations at their terminals. This modeling is independent of the test frequency and the impedances of the component. The mechanism of nonlinearity in FET's is explained. Simulation results show the utility of this model in broadband amplifier design. Author (ESA)

N82-15353# Westinghouse Electric Corp., Baltimore, Md. Advanced Technology Labs.
ADVANCED PLANAR SILICON TEST STRUCTURES Final Report, 1 Jan. 1978 - 31 Oct. 1979
D. McCarthy, J. Acevedo, and D. Herman Jul. 1981 94 p refs
(Contract NBS-6-35766; ARPA Order 2397)
(PB81-229155; NBS-GCR-81-327) Avail: NTIS HC A05/MF A01 CSCL 09E

An integrated structure that is used to measure pn junction reverse bias leakage current was implemented in modular test chips to investigate the effects of certain design parameters on the leakage measurements. The test structure is composed of a gated diode, a reset switch, and an integrally connected source follower MOSFET which functions as an electrometer. The automated measurement procedure is discussed, and data obtained using the test structure are analyzed to determine the bulk generation life-time and the surface recombination velocity in processed silicon wafers. GRA

N82-15354# National Bureau of Standards, Washington, D.C. National Engineering Lab.
DEVELOPMENT OF TEST STRUCTURES FOR CHARACTERIZATION OF THE FABRICATION AND PERFORMANCE OF RADIATION-HARDENED CHARGE-COUPLED DEVICE (CCD) IMAGERS Annual Report, 15 May 1980 - 14 May 1981
G. P. Carver Aug. 1981 27 p refs Sponsored in part by Draper (Charles Stark) Lab., Inc., Cambridge, Mass.
(PB81-244071; NBSIR-2319) Avail: NTIS HC A03/MF A01 CSCL 09A

Test structures and test methods for the characterization of radiation-hardened charge coupled devices (CCD) imagers were evaluated. The results of measurements on CCD imager wafers using the surface-channel and buried-channel, integrated gated-diode electrometers, before and after exposure to Co60 radiation, and using the cross bridge/electrical alignment test structures are reported. Examples of cross sections of the CCDs made by beveling and staining are also presented. Author

N82-15355# National Bureau of Standards, Washington, D.C. Center for Electronics and Electrical Engineering.
DEVELOPMENT OF POWER SYSTEM MEASUREMENTS Quarterly Report, 1 Apr. - 30 Jun. 1981
R. E. Hebner, ed. Jun. 1981 21 p refs
(Contract DOE-EA-77-A-01-6010)
(PB81-246860; NBSIR-81-2334) Avail: NTIS HC A02/MF A01 CSCL 09A

Measurements of ion density in air, the use of signals above 1 GHz to detect incipient faults in cables, the measurement of the by-products which develop during partial discharge activity in SF sub 6, and the determination of the breakdown behavior of an oil-paper interface are discussed. DOE

N82-15356# National Bureau of Standards, Washington, D.C. National Engineering Lab.
USING A TEM (TRANSVERSE ELECTROMAGNETIC) CELL FOR EMC MEASUREMENTS OF ELECTRONIC EQUIPMENT
M. L. Crawford and J. L. Workman Jul. 1981 71 p refs
(PB81-244857; NBS-TN-1013) Avail: NTIS HC A04/MF A01 CSCL 09C

The physical design and electrical evaluation of pertinent parameters which influence the use and operation of a transverse electromagnetic (TEM) cell are described. Detailed, step-by-step procedures are given for using a TEM cell for performing either radiated EM susceptibility testing or for measuring radiated EM emissions from electronic/electro-mechanical equipment. GRA

N82-15357# National Bureau of Standards, Washington, D.C. Electron Devices Div.
SOME CONSIDERATIONS REGARDING FILM THICKNESS STANDARDS FOR THE SEMICONDUCTOR INDUSTRY
James R. Ehrstein Nov. 1980 15 p refs
(PB81-239535; NBSIR-80-2158) Avail: NTIS HC A02/MF A01 CSCL 09E

Some of the requisite properties of Standard Reference Materials (SRMs) for effective use in improving the uniformity of measurements are presented. Some of the limitations imposed by real world thin film specimens and our state of understanding of their properties as well as by the different types of measurements available are then considered. Finally, the need for improved measurement control will be related to the SRM program in light of these limitations. GRA

N82-15358# National Bureau of Standards, Washington, D.C.
PLANE-WAVE SCATTERING-MATRIX THEORY OF ANTENNAS AND ANTENNA-ANTENNA INTERACTIONS
David M. Kerns Jun. 1981 182 p
(PB81-245243; NBS-MONO-162; LC-81-600015) Avail: NTIS HC A09/MF A01 CSCL 09E

The use of plane wave spectra for the representation of fields in space and the consideration of antenna-antenna (and antenna-scatterer) interactions at arbitrary separation distances are discussed. The plane wave representation is eminently suitable for this purpose as well as for the expression of conventional asymptotic quantities of antenna theory, such as power gain, effective area, and polarization. The primary objective is to facilitate the critical acceptance and proper application of antenna and field measurements techniques deriving more or less directly from the plane wave scattering matrix theory of antennas and antenna interactions. A secondary objective is to present some recent and some new theoretical results based on this theory. GRA

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N82-15359*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
RELATIONS FOR THE THERMODYNAMIC AND TRANSPORT PROPERTIES IN THE TESTING ENVIRONMENT OF THE LANGLEY HYPERSONIC CF4 TUNNEL
Kenneth Sutton Oct. 1981 40 p refs
(NASA-TM-83220) Avail: NTIS HC A03/MF A01 CSCL 20D

Thermodynamic and transport properties of gaseous CF4 that can be used in flow field computer codes and theoretical analyses for comparison of results with experimental data from the Langley Hypersonic CF4 Tunnel are presented. The thermodynamic relations which are based on thermally perfect but calorifically imperfect gas are adequate for the testing environment of the CF4 tunnel and are simpler to use than the imperfect gas relations required to define the complete expansion from the tunnel reservoir. Relations for the transport properties are based on the kinetic theory of gases in which published experimental data are used in the derivation of the relations. Extensive experimental data were located for viscosity and the derived relation should provide values for viscosity with errors of less than 1 percent. The experimental data for thermal conductivity were limited with

significant disagreement between the various sources. The derived relation will probably provide values for the thermal conductivity with errors of no more than 5 percent which is within the accuracy of the experimental data. M.D.K.

N82-15360*# Oklahoma State Univ., Stillwater. School of Mechanical and Aerospace Engineering.

INVESTIGATIONS OF FLOWFIELDS FOUND IN TYPICAL COMBUSTOR GEOMETRIES Semiannual Status Report, 1 Jan. - 31 Jul. 1981

D. G. Lilley and D. K. McLaughlin (Dynamics Technology, Inc., Torrance, Calif.) 31 Jul. 1981 243 p refs

(Grant NAG3-74)

(NASA-CR-165061; SASR-2) Avail: NTIS HC A11/MF A01 CSCL 20D

The flowfields of gas turbine combustion chambers were investigated. Six flowfield configurations with sidewall angles alpha = 90 and 45 deg. and swirl vane angles phi = 0, 45 and 70 deg. are characterized. Photography of neutrally-buoyant helium-filled soap bubbles, tufts, and injected smoke helps to characterize the time-mean streamlines, recirculation zones and regions of highly turbulent flow. Five-hole pitot probe pressure measurements allow the determination of time-mean velocities u, v and w. An advanced computer code equipped with a standard two-equation kappa-epsilon turbulence model was used to predict corresponding flow situations and to compare results with the experimental data. J.D.H.

N82-15361*# Old Dominion Univ., Norfolk, Va. Research Foundation.

INFLUENCE OF PRECURSOR HEATING ON VISCOUS FLOW AROUND A JOVIAN ENTRY BODY Final Report, 1 Jan. - 31 Dec. 1977

S. N. Tiwari and K. Y. Szema Washington, D.C. NASA Oct. 1979 145 p refs

(Contract NAS1-14193-27)

(NASA-CR-3174) Avail: NTIS HC A07/MF A01 CSCL 20D

The influence of changes in precursor region flow properties (resulting from the absorption of radiation from the shock layer) on the entire shock layer flow phenomena was investigated. The axially symmetric case is considered for both the preheating zone (precursor region) and shock layer. The flow in the shock layer is assumed to be viscous with chemical equilibrium but radiative nonequilibrium. Realistic thermophysical and spectral models are employed, and results are obtained by implicit finite difference and iterative procedures. The results indicate that precursor heating increases the radiative heating of the body by a maximum of 7.5 percent for 116 km entry conditions. Author

N82-15362# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ACTA MECHANICA SINICA (SELECTED ARTICLES)

29 Oct. 1981 59 p refs Transl. into ENGLISH from Acta Mechanica Sinica (China), no. 4, 1979 p 303-322, 344-352 (AD-A108123; FTD-ID(RS)T-0707-81) Avail: NTIS HC A04/MF A01 CSCL 20/4

Applications of computational fluid dynamics are addressed. Cascade flow in tub turbomachine blades, traveling shock wave in shock tubes, and unstarted choked regime are among the topics discussed. For individual titles, see N82-15363 through N82-15365.

N82-15363# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

GENERALIZED VARIATIONAL PRINCIPLES, VARIATIONAL PRINCIPLES AND DUAL EXTREMUM PRINCIPLES OF GASDYNAMICS FOR THE DIRECT PROBLEM OF TURBOMACHINE AIRFOIL CASCADES ON AN ARBITRARY STREAM SHEET OF REVOLUTION

Liu Gao-Lian *In its* Acta Mechanica Sinica (Selected Articles), No. 4, 1980 (FTDID(RS)T07078-81) 29 Oct. 1981 p 1-22 refs Transl. into ENGLISH from Acta Mechanica Sinica (China), no. 4, 1979 Presented at the Natl. Experience Exchange Meeting in the Thermodyn. Calculation, Design and Expt. of the Aerodyn. of Turbomachines (For primary document see N82-15362 06-34) Avail: NTIS HC A04/MF A01 CSCL 20/4

Variational principles are derived for the direct aerodynamic problem of channels and airfoil cascades (with prescribed distributed mass injection and/or suction along the profile contours for blade cooling or boundary layer control) on an arbitrary stream sheet of revolution in order to provide a rigorous and sound theoretical basis for introducing and applying the finite element method to computational aerodynamics of turbomachine airfoils. Three generalized variational principles are developed and from them three families of variational principles are derived by means of successive transformations. A pair of dual extremum principles are shown to exist for homoentropic subsonic flows. In order to simplify the numerical treatment of various boundary conditions characterizing the complexity of the cascade problem all boundary conditions are converted to natural ones. J.M.S.

N82-15364# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CALCULATION OF UNSTARTED-CHOKED REGIME OF SUPERSONIC AND TRANSONIC COMPRESSOR CASCADES

Cheng Jia-gang *In its* Acta Mechanica Sinica (Selected Articles), No. 4, 1980 (FTD-ID(RS)T-0707-81) 29 Oct. 1981 p 23-39 refs Transl. into ENGLISH from Acta Mechanica Sinica (China), no. 4, 1979 (For primary document see N82-15362 06-34) Avail: NTIS HC A04/MF A01 CSCL 20/4

Unstarted-choked regime of supersonic and transonic cascade, is studied. A semiempirical method is given which allows for calculating operating incidence of this regime. This method also gives useful results under the condition of downstream throttle, or at various axial velocity density ratio. Other performance parameters such as total pressure loss, pressure ratio and low deviation angle may be obtained simultaneously. The calculating results obtained show this method is reliable. Because this method is simple and convenient, it may be adopted to analyze the aerodynamic performance of cascades and the influence of geometric parameters and dynamic parameters on cascade performance. J.M.S.

N82-15365# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE NUMERICAL COMPUTATION FOR DIFFRACTION AND REFLECTION OF A TRAVELING SHOCK WAVE FROM AN OPEN END OF A SHOCK-TUBE

Du Xun, Wei Zhong-lei, Li Wen-xuan, and Wang Jia-jun *In its* Acta Mechanica Sinica (Selected Articles), No. 4, 1980 (FTD-ID (RS)T0707-81) 29 Oct. 1981 p 40-56 refs Transl. into ENGLISH from Acta Mechanica Sinica (China), no. 4, 1979 (For primary document see N82-15362 06-34)

Avail: NTIS HC A04/MF A01 CSCL 20/4

When a shock wave travels from an open end of shock-tubes an over-pressure field is induced and wave diagrams of shock diffraction and reflection form immediately. In general the outflow problem can be computed by solving the unsteady two dimensional gasdynamic equations. This problem is computed numerically, using Eulerian coordinates, fictitious viscosity, and finite difference method. In order to decide the boundary conditions for computation at the end of tube, analytical solution for the unsteady one dimensional flow in a shock-tube, and then the variations of the velocity, pressure and density of the flow at the open end of the tube with time. The present numerical results are in agreement with the experiments. J.M.S.

N82-15366*# Astro Research Corp., Carpinteria, Calif.

LIGHTWEIGHT MOVING RADIATORS FOR HEAT REJECTION IN SPACE Final Report

Karl Knapp 10 Nov. 1981 50 p refs

(Contract NAS8-34191)

(NASA-CR-161943; ARC-TN-1107) Avail: NTIS HC A03/MF A01 CSCL 20D

Low temperature droplet stream radiators, using nonmetallic fluids, can be used to radiate large amounts of waste heat from large space facilities. Moving belt radiators are suitable for use on a smaller scale, radiating as few as 10 kW from shuttle related operations. If appropriate seal technology can be developed, moving belt radiators may prove to be important for high temperature systems as well. Droplet stream radiators suitable for operation at peak temperatures near 300 K and 1000 K were studied using both freezing and nonfreezing droplets. Moving belt radiators were also investigated for operation in both temperature ranges. The potential mass and performance

characteristics of both concepts were estimated on the basis of parametric variations of analytical point designs. These analyses included all consideration of the equipment required to operate the moving radiator system and take into account the mass of fluid lost by evaporation during mission lifetimes. Preliminary results indicate that low temperature droplet stream radiator appears to offer the greatest potential for improvement over conventional flat plate radiators. A.R.H.

N82-15367# Technische Universitaet, Hanover (West Germany). Abt. Kaeltetechnik.

ROTATING REGENERATIVE HEAT EXCHANGER FOR ENERGY RECOVERY IN CHEMICAL PLANTS Final Report, Jul. 1979

Reinhard Vauth Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 198 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-099; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 36,30

The behavior of a rotary heat exchanger was analyzed with special regard to heat and mass transfer. Parallel to measurements at such a rotary heat exchanger with non-absorbant matrix a mathematic model was developed to simulate the heat and mass transfer. The correlation of experimental and theoretical results shows that the experimental data can be calculated by the mathematical model within an accuracy which is usual for calculating heat and mass transfer. Within a variation of several parameters for the working medium (humid air) the influences of operating conditions on the exchange characteristic of regenerative heat exchangers with rotating matrix were examined. A study of parameters with the working medium flue-gas, which was thought as a possible application of the mathematic model, confirms the results which were found with the working medium humid air. Author

N82-15368# Orlando Technology, Inc., Shalimar, Fla.

HULL/EPIC3 LINKED EULERIAN/LAGRANGIAN CALCULATION IN THREE DIMENSION Contract Report, Jul. 1979 - Oct. 1980

Daniel A. Matuska and John J. Osborn Sep. 1981 102 p

(Contract DAAK11-79-C-0106)

(AD-A106033; ARBRL-CR-00467; AFATL-TR-81-71) Avail: NTIS HC A06/MF A01 CSCL 19/4

This report documents a demonstration calculation performed to evaluate the three dimensional Eulerian/Lagrangian linked hydrocode developed under this contract. The calculation consists of a staballoy rod impacting an armor plate at obliquity 65 degrees and velocity 1 km/sec. Calculational results compared favorably with experimental data. The linked calculation was completed with the use of about nine total CDC 7600 computer hours as compared to the estimated 25 hours if the calculation had been run with only the Eulerian code.

Author (GRA)

N82-15369# Oak Ridge National Lab., Tenn. Engineering Technology Div.

DEVELOPMENT AND ADAPTATION OF CONDUCTION AND RADIATION HEAT-TRANSFER COMPUTER CODES FOR THE CFTL

J. C. Conklin Aug. 1981 39 p refs

(Contract W-7405-eng-26)

(DE81-028033; ORNL/TM-7854) Avail: NTIS HC A03/MF A01

RODCON and HOTTEL are two computational methods used to calculate thermal and radiation heat transfer for the Core Flow Test Loop (CFTL) analysis efforts. RODCON was developed at ORNL to calculate the internal temperature distribution of the fuel rod simulator (FRS) for the CFTL. RODCON solves the time-dependent heat transfer equation in two dimensional (R angle) cylindrical coordinates at an axial plane with user-specified radial material zones and time- and position-variant surface conditions at the FRS periphery. HOTTEL is a revision of an algorithm developed by C.B. Baxi at the General Atomic Company to be used in calculating radiation heat transfer in a rod bundle enclosed in a hexagonal duct. HOTTEL uses geometric view factors, surface emissivities, and surface areas to calculate the gray-body or composite view factors in an enclosure having multiple reflections in a nonparticipating medium. DOE

N82-15370# Sandia Labs., Livermore, Calif. Dept. of Combustion Sciences.

RAMAN-SCATTERING GAS TEMPERATURE MEASUREMENTS IN PARTICLE-LADEN FLOWS

W. L. Flower Jul. 1981 21 p refs Presented at the Symp. on Instrumentation and Control for Fossil Energy Processes, San Francisco, 8 Jun. 1981

(Contract DE-AC04-76DP-00789)

(DE81-029621; SAND-81-8608; CONF-810607-13) Avail: NTIS HC A02/MF A01

The feasibility of making time-averaged Raman-scattering temperature measurements in highly luminous flows was investigated in tests on the Sandia Atmospheric Combustor Exhaust Simulator facility. The diluted exhaust stream from a methane-burning combustor was seeded with 5 micrometer diameter fly ash particles. Test temperatures ranged from 900 K to 1450 K at particle densities up to 6000 particles/cc. A pulsed argon-ion probe laser and a gated detection system for enhancement of signal-to-background ratio were used. Scans of the Stokes Q-branch vibrational Raman spectrum of nitrogen were fit by calculated spectra to determine temperature. The Raman-scattered signal was small but measurable in all cases. There was no apparent laser-induced interference from either fluorescence or particle incandescence. Good agreement between Raman-scattering temperature measurements and radiation corrected thermocouple measurements was obtained. DOE

N82-15371# Oak Ridge National Lab., Tenn.

STEADY-STATE HEAT TRANSFER TO BOILING LIQUID HELIUM IN SIMULATED COIL WINDINGS

P. L. Walstrom 1981 20 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10 Aug. 1981

(Contract W-7405-eng-26)

(DE81-028561; CONF-810835-3) Avail: NTIS HC A02/MF A01

The present data show that the worst case steady-state stability in the GE/LCT magnet windings is at a horizontal conductor orientation. The heat transfer improves with inclination of the conductor from horizontal. Calculations show that for these small regions normal zones will recover by cold-end conduction from the inclined conductor on either end. DOE

N82-15372# Los Alamos Scientific Lab., N. Mex.

SHOCK-COMPRESSION MEASUREMENTS AT PRESSURES GREATER THAN 1 TPa

C. E. Ragan 1981 5 p refs Presented at the 8th AIRAPT Conf. and the 19th EHPRG Conf., Uppsala, 17 Aug. 1981

(Contract W-7405-eng-36)

(DE81-030113; LA-UR-81-2426; CONF-810827-10) Avail: NTIS HC A02/MF A01

Precise Hugoniot data were obtained for samples of aluminum, quartz, iron, molybdenum, and low density molybdenum using the impedance matching technique. An underground nuclear explosion drove a nearly planar, 5-TPa shock into a molybdenum standard. Shock velocities were measured with 1.5% to 2.5% accuracies. DOE

N82-15373# Sandia Labs., Albuquerque, N. Mex.

TIME-RESOLVED WAVE PROFILE MEASUREMENTS IN COPPER TO MEGABAR PRESSURES

L. C. Chhabildas and J. R. Asay 1981 7 p refs Presented at the 8th AIRAPT Conf. and 19th EHPRG Conf., Uppsala, 17 Aug. 1981

(Contract DE-AC04-76DP-00789)

(DE81-026109; SAND-81-1358C) Avail: NTIS HC A02/MF A01

Time-resolved measurements of copper at shock induced high pressures and temperatures are used to illustrate the capability of using such techniques to investigate high pressure strength. Continuous shock loading and release wave profiles were made to 93 GPa using veocity interferometric techniques. Fine structure in the release wave profiles from the shocked state indicates an increase in shear strength of copper to 1.5 GPa at 93 GPa from its ambient value of 0.08 GPa. DOE

N82-15374# Los Alamos Scientific Lab., N. Mex. Theoretical Div.

NUMERICAL SIMULATION OF THE COUNTERCURRENT FLOW IN A GAS CENTRIFUGE

Lawrence D. Cloutman and Richard A. Gentry 1981 29 p refs Presented at the 4th Workshop on Gases in Strong Rotation, Oxford, 24-27 Aug. 1981

(Contract W-7405-eng-36)

(DE81-030283; LA-UR-81-1821; CONF-810845-2) Avail: NTIS HC A03/MF A01

A finite difference method is presented for the numerical simulation of the axisymmetric countercurrent flows in gas centrifuge. A time marching technique is used to relax an arbitrary initial condition to the desired steady state solution. All boundary layers may be resolved. It is concluded that this technique is capable of accurately predicting the performance of a wide variety of machines under all operating conditions of interest. DOE

N82-15375# Battelle Pacific Northwest Labs., Richland, Wash.

ANALYSIS OF COLUMN TRACER EXPERIMENTS BY A STOCHASTIC-CONVECTIVE TRANSPORT METHOD

C. S. Simmons Apr. 1981 30 p Presented at the AGU Champman Conf. on Spatial Variability in Hydrologic Modeling, Fort Collins, Colo., 21-23 Jul. 1981

(Contract DE-AC06-76RL-01830)

(DE81-030088; PNL-SA-9478; CONF-810761-1) Avail: NTIS HC A03/MF A01

A stochastic-convective transport formulation for describing solute transport in porous media, and based upon solute travel time probability is presented. It is shown to include Fickian transport as a special subcase. It is further demonstrated that a travel time probability associated with a log-normal distribution of hydraulic conductivity will yield concentration breakthrough curves nearly equivalent to Fickian transport when the coefficient of variation in travel time is < or = 1. Laboratory measured hydrodynamic dispersion may be ascribed to local variations in hydraulic conductivity. The travel time formulation is shown to provide a direct link between measured dispersivity and the autocovariance of local flow velocity variation. Dispersivity is shown to manifest a scale effect by increasing in proportion to the length of a system when the velocity correlation range is greater than the length. Chemical absorption effects are described by simply scaling the travel time probability with a retardation factor. DOE

N82-15376# Stuttgart Univ. (West Germany). Inst. fuer Kernenergetik und Energiesysteme.

HEAT TRANSPORT AND CONDUCTION LAYERS IN GRAVITY-ASSISTED HEAT PIPES Ph.D. Thesis [WAERMEUEBERTRAGUNG UND LEISTUNGSGRENZEN IN SCHWERKRAFTUNTERSTUETZTEN WAERMEROHREN]

Hung Nguyen-Chi Feb. 1980 141 p refs In GERMAN; ENGLISH summary

(IKE-5-212; ISSN-0173-6892) Avail: NTIS HC A07/MF A01

The steady state performance and the limiting heat transport capability of gravity-assisted screen-wicked heat pipes with a liquid overfill are discussed in the present work. A semi-empirical correlation between the maximum heat flux density, or maximum heat transport rate, and various influence parameters, viz. tilt angle, fill charge, number of screen mesh layers, screen mesh size, operating temperature, heat pipe diameter and evaporator length, is derived. Moreover, the heat transfer phenomenon within the heat pipe as well as the effect of the screen structure on the bubble growth process is thoroughly investigated. Finally, the work confirms the complexity of the influence of screen mesh size and of the multiple-layer screen mesh configuration on the wall superheat required for the nucleation of the first bubbles, on the capillary force and on the wick porosity. Author

N82-15377# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.

CALCULATION OF THREE-DIMENSIONAL INSTABILITY MODES IN A BLASIUS BOUNDARY LAYER

Chen Mao-Zhang (Peking Inst. of Aeronautics and Astronautics) and P. Bradshaw May 1981 33 p refs Sponsored in part by Government of the People's Republic of China

(IC-Aero-81-01; ISSN-0308-7247) Avail: NTIS HC A03/MF A01

Transition from laminar to turbulent flow was investigated computationally for downstream flow. Wortmann's qualitative model which is a three dimensional structure composed of the basic flow and longitudinal counterrotating, overlapping vortex sheets inclined downstream was tested. The relation between eigenvalues for two dimensional and three dimensional disturbances was established. Numerical calculations of the spanwise component of the fluctuating velocity agree fairly well with Wortmann's measurements and substantiate the model. Author (ESA)

N82-15378# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany). Abt. Turbulen Berlin

EXPERIMENTAL INVESTIGATION OF THE INFLUENCE OF THE CASING GEOMETRY UPON THE FLOW CONDITIONS AND THE NOISE OF A CENTRIFUGAL FAN Ph.D. Thesis - Technischen Univ.,

Teofani Gikadi Feb. 1981 137 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-736)

(DFVLR-FB-81-20; ESA-TT-736) Avail: NTIS HC A07/MF A01; DFVLR, Cologne DM 23.30

Beginning with a casingless impeller with six backward curved blades, the influence of a small logarithmic volute casing with a cut-off clearance of delta r/R = 0.014 (R = impeller radius) upon the flow through the rotating impeller ducts was studied. It is found that there is a blockage of the flow in each impeller duct when passing the cut-off due to the small cut-off clearance. An optimization of the casing geometry regarding low noise and high fan efficiency lead to a logarithmic spiral with a large out-off clearance of delta r/R = 0.3. The noise was reduced by 22 dB without loss in fan efficiency. T.M.

N82-15379# Research Inst. of National Defence, Umea (Sweden). Huvudavdelning 3.

FORMATION AND SPREADING OF EXPLOSIVE AND TOXIC GAS CLOUDS. A STUDY OF THE LITERATURE

Kenneth Nyren, Stellan Winter, Ola Hertzberg, and Edvard Karlsson Oct. 1981 98 p refs In SWEDISH; ENGLISH summary

(FOA-C-40141-C1) Avail: NTIS HC A05/MF A01

The outflow and aerosol formation at a leakage of pressurized condensed gas, gravity dispersion and the influence of the terrain on heavy gas, are emphasized. It is shown that gas escape, aerosol formation and dispersion of heavy gas on a plane surface are treated considerably more in international literature than the influence of the terrain on the behavior of a heavy gas. Models for calculating discharge and dispersion of heavy gas exist in several countries. Those models demand considerable background knowledge to be applied and recommendations are given how to plan the model work. T.M.

N82-15380# Texas A&M Univ., College Station. Coastal, Hydraulic, and Ocean Engineering Group.

SIMULATANEOUS WAVE AND CURRENT FORCES ON CYLINDER NEAR THE BOTTOM BOUNDARY

David A. Knoll and John B. Herbich May 1981 99 p refs (Grant NOAA-04-7-158-44105)

(PB81-243990; TAMU-SG-81-203; NOAA-81070807) Avail: NTIS HC A05/MF A01 CSCL 13B

The interaction of waves and currents and their relationship to the forces on submerged pipelines was investigated. A model pipeline in a wave current test facility was used to obtain experimental force values which were compared to values predicted by various theoretical methods of representing wave propagation in a current. The parameters for fluid force are affected by the interaction of waves and currents, and the variations of these parameters are presented. GRA

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N82-15381* National Aeronautics and Space Administration. Pasadena Office, Calif.

FARADAY ROTATION MEASUREMENT METHOD AND APPARATUS Patent

Milton H. Brockman, inventor (to NASA) (JPL, California Inst. of Tech., Pasadena) Issued 13 Oct. 1981 10 p Filed 21 Dec. 1979 Supersedes N80-16313 (18 - 07, p 0857) Sponsored by NASA

(NASA-Case-NPO-14839-1; US-Patent-4,295,140; US-Patent-Appl-SN-106119; US-Patent-Class-343-100PE; US-Patent-Class-455-60; US-Patent-Class-455-137; US-Patent-Class-455-139) Avail: US Patent and Trademark Office CSCL 14B

A method and device for measuring Faraday rotation of a received RF signal is described. A simultaneous orthogonal polarization receiver compensates for a 3 db loss due to splitting of a received signal into left circular and right circular polarization channels. The compensation is achieved by RF and modulation arraying utilizing a specific receiver array which also detects and measures Faraday rotation in the presence or absence of spin stabilization effects on a linear polarization vector. Either up-link or down-link measurement of Faraday rotation is possible. Specifically, the Faraday measurement apparatus utilized in conjunction with the specific receiver array provides a means for comparing the phase of a reference signal in the receiver array to the phase of a tracking loop signal related to the incoming signal, and comparing the phase of the reference signal to the phase of the tracking signal shifted in phase by 90 degrees. The averaged and unaveraged signals, are compared, the phase changes between the two signals being related to Faraday rotation.

Official Gazette of the U.S. Patent and Trademark Office

N82-15382 Deutsches Geodaetisches Forschungsinstitut, Munich (West Germany).

EMPIRICAL-STATISTICAL INVESTIGATIONS OF THE ACCURACY STRUCTURE OF PHOTOGRAMMETRIC AERIAL PHOTOGRAPHS Ph.D. Thesis - Stuttgart Univ. [EMPIRISCH-STATISTICHE UNTERSUCHUNGEN ZUR GENAUIGKEITSSTRUKTUR DES PHOTOGRAMMETRISCHEN LUFTBILDES]

Matthaeus Schilcher Verlag der Bayerischen Akademie der Wissenschaften 1980 190 p refs In GERMAN

(Ser-C-262; ISSN-0065-5325; ISBN-3-7696-9314-0) Copyright. Avail: Issuing Activity

Single aerial photographs were empirically-statistically investigated, with emphasis on the stochastic aspects of the picture, for basic research into photogrammetric point determination. By making use of two series of wide angle and superwide angle shots and empirical-statistical analyses, the variance and covariance characteristics of the picture coordinates inside the picture and between different pictures were investigated for a sample of 5000 points. The results lead to answers for existing questions about the functional, and especially the stochastic, photogrammetric point determination model, and also to a better foundation for aerotriangulation. Author (ESA)

N82-15383*# Desert Research Inst., Reno, Nev.

THE THIRD INTERNATIONAL CLOUD CONDENSATION NUCLEI WORKSHOP Final Report

W. C. Kocmond, C. R. Rogers, ed., and S. W. Rea, ed. Nov. 1981 287 p refs Workshop held in Reno, Nev., 6-17 Oct. 1980; sponsored in part by NSF

(Contract NAS8-33820)

(NASA-CP-2212) Avail: NTIS HC A13/MF A01 CSCL 14B

Twenty-five instruments were tested, including size characterization devices and two Aitken counters. The test aerosols were supplied to the instruments by an on-line generation system, thereby eliminating the need for storage bags. Cloud condensation chambers and haze chambers are highlighted. For individual titles, see N82-15384 through N82-15407.

N82-15384*# Wyoming Univ., Laramie.

CONTRIBUTION TO CCN WORKSHOP REPORT FROM UNIVERSITY OF WYOMING GROUP

David C. Rogers and Marcia K. Politovich *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 11-13 refs (For primary document see N82-15383 06-35)

Avail: NTIS HC A13/MF A01 CSCL 14B

The group's CCN counter is described. It is a static, horizontal, parallel plate thermal gradient diffusion chamber. Examples of the application of the CCN are presented and include the CCN spectra measured during the winter of 1978-79 near Elk Mountain, Wyoming. Comparisons of droplet concentrations derived from upwind CCN spectra are covered. T.M.

N82-15385*# Naval Research Lab., Washington, D. C.

DESCRIPTION AND DISCUSSION OF THE NRL TGDCC

W. A. Hoppel and T. A. Wojciechowki *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 14-16 refs (For primary document see N82-15383 06-35)

Avail: NTIS HC A13/MF A01 CSCL 14B

The NRL thermal gradient diffusion cloud chamber (TGDCC) consists of two plates 7.5 cm in diameter separated by 1.25 cm and covered with saturated filter paper. The cylindrical wall separating the plates is glass. The top plate is at room temperature and the bottom plate is cooled with a thermoelectric cooler. The temperature difference is measured with several sets of thermocouples. The CCN concentration was determined from the video recording. This procedure of averaging the maximum count obtained on several successive recordings at the same supersaturation results in concentrations which are somewhat higher than concentrations calculated from an average across the plateau. T.M.

N82-15386*# Clermont-Ferrand Univ. (France).

THE CCN COUNTER OF THE IOPG OF PUY DE DOME: MAIN CHARACTERISICS AND RESULTS OF MEASUREMENTS

Roger Serpolay *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 17-19 (For primary document see N82-15383 06-35)

Avail: NTIS HC A13/MF A01 CSCL 14B

In performing the data analysis of the measurements achieved during the Workshop with the device, a global approach was preferred rather than an individual analysis, in order to illustrate some main characteristics in the behavior of the device with respect to a mean behavior resulting from a general survey of all the equipments involved in each experiment. The device tends generally to overestimate the CCN concentrations measured near the high supersaturations and sometimes underestimates the concentrations close to 0.1% or 0.2% of supersaturation. Despite the fact that it belongs to a type of static diffusion chamber, it shows, however, similar spectra to those obtained with other types of chambers (continuous flow diffusion chamber and haze chamber). Author

N82-15387*# Missouri Univ. -Rolla. Center for Cloud Physics Research.

UMR DUAL MODE CCN COUNTER (MODES: CFD PLUS HAZE)

D. J. Alofs and M. B. Trueblood *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 20-22 refs (For primary document see N82-15383 06-35) (Grant NSF ATM-79-24326)

Avail: NTIS HC A13/MF A01 CSCL 14B

The chamber consists of two vertical plates 100 cm long in the vertical direction and 13 cm wide, with a 0.8 cm spacing between the plates. The haze mode is used for the nuclei active at supersaturations (S) from 0.0133 to 0.173%. In this mode the two plates are kept at the same temperature (25 C). In the CFD mode the supersaturation is determined by the temperature difference between the two plates. About 40 minutes is required

to obtain a spectrum (5 values of S in the CFD mode, plus 7 values of S in the haze mode). About half of this time is used to adjust the temperatures and flows; the rest is used in actual counting of the nuclei. Comparisons of the counter to other types of counters are reported. T.M.

N82-15388*# Washington Univ., Seattle. Cloud and Aerosol Research Group.

A CLOUD CONDENSATION NUCLEUS SPECTROMETER DESIGNED FOR AIRBORNE MEASUREMENTS

Lawrence F. Radke, Stephen K. Domonkos, and Peter V. Hobbs *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 23-25 refs (For primary document see N82-15383 06-35)
(Contract NAS8-33148)
Avail: NTIS HC A13/MF A01 CSCL 14B

The spectrometer is a simple extension of the continuous flow diffusion chamber (CFDC) operated in the vertical mode. The principal new design features of the instrument are its rapid time response and ability to rapidly measure the CCN activity spectrum. The activity spectrum of CCN in an air sample is measured by simultaneously operating the spectrometer at four supersaturations. The CCN spectrometer consists of four essentially indepenent CFDC's in a parallel array. Each CFDC is 61 cm long, 10 cm wide, and consists of two vertical parallel plates 1 cm apart, maintained at different temperatures. Each CFDC has a single particle optical counter located at the center of its base. T.M.

N82-15389*# Commonwealth Scientific and Industrial Research Organization, Sydney (Australia).

STATIC DIFFUSION CLOUD CHAMBERS

Greg Ayers *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 26-27 refs (For primary document see N82-15383 06-35)
Avail: NTIS HC A13/MF A01 CSCL 14B

The chamber geometry and optical arrangement are described. The supersaturation range is given and consists of readings taken at five fixed points: 0.25%, 0.5%, 0.75%, 1.0%, and 1.25%. The detection system is described including light source, cameras, and photocell detectors. The temperature control and the calibration of the chamber are discussed. T.M.

N82-15390*# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.

AN AIRBORNE ISOTHERMAL HAZE CHAMBER

Edward E. Hindman *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 28-32 refs (For primary document see N82-15383 06-35)
(Contract N00014-79-C-0793)
Avail: NTIS HC A13/MF A01 CSCL 14B

Thermal gradient diffusion cloud chambers (TGDCC) are used to determine the concentrations of cloud condensation nuclei (CCN) with critical supersaturations greater than or equal to about 0.2%. The CCN concentrations measured with the airborne IHC were lower than theoretically predicted by factors ranging between 7.9 and 9.0. The CCN concentrations measured with the airborne IHC were lower than the concentrations measured with the larger laboratory IHC's by factors ranging between 3.9 and 7.5. The bounds of the supersaturation ranges of the airborne IHC and the CSU-Mee TGDCC do not overlap. Nevertheless, the slopes of the interpolated data between the bounds agree favorably with the theoretical slopes. T.M.

N82-15391*# Meteorological Office, Bracknell (England).

A DESCRIPTION OF THE UK METEOROLOGICAL OFFICE CCN COUNTER

M. Kitchen and E. Stirland *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 33-34 (For primary document see N82-15383 06-35)
Avail: NTIS HC A13/MF A01 CSCL 14B

The chamber is a thermal gradient diffusion type with the upper plate at room temperature and the lower plate thermoelectrically cooled. The light from a 25W projector bulb is focused in a beam of approximations 1x3 mm in the central part of the chamber. The light scattered by drops is viewed in the forward direction (40 deg) by a microscope and a sensitive photodetector. Experiments were performed to relate the peak output from the photocell with the maximum number of drops in the beam recorded photographically. The microscope is used to check the calibration at low concentrations of CCN. The results of the experiments and the performance of the counter are reported. T.M.

N82-15392*# Alaska Univ., Fairbanks. Geophysical Inst.

CLOUD CONDENSATION NUCLEUS COUNTER BY IMPACTOR SAMPLING TECHNIQUE

Takeshi Ohtake *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 35-36 ref (For primary document see N82-15383 06-35)
Avail: NTIS HC A13/MF A01 CSCL 14B

Unlike typical CCN counters, this device counts the numbers of water droplets condensed on aerosol particles sampled on a microcover glass at various different relative humidities. The relative humidities ranged from 75 percent to a calculated value of 110 percent. A schematic of the apparatus is shown. The individual CCN can be identified in an optical micrograph and scanning electron micrograph and may be inspected for their chemical composition later. T.M.

N82-15393*# York Univ., Downsview (Ontario).

DIFFUSION TUBE

R. Leaitch and W. J. Megaw *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 37-39 (For primary document see N82-15383 06-35)
Avail: NTIS HC A13/MF A01 CSCL 14B

The diffusion tube was designed to operate below about 0.25 percent of water supersaturation. It is simply a long tube lined on the inside with a damp chamois cloth, and heated isothermally to a few degrees centigrade above the incoming air. The diffusion coefficient for water vapor is slightly larger than that for heat, making it possible to supersaturate the airflow. This is the same principle by which transient supersaturations may occur in parallel plate cloud chambers. Only the diffusion of vapor and heat from the walls into the moving air are considered. T.M.

N82-15394*# State Univ. of New York, Albany. Automated Sciences Research Center.

AN AUTOMATIC LIGHT SCATTERING CCN COUNTER

G. Garland Lala *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 40-41 ref (For primary document see N82-15383 06-35)
Avail: NTIS HC A13/MF A01 CSCL 14B

The counter is a static thermal diffusion chamber which has been modified to include an optical system for the determination of droplet concentration by the measurement of scattered light. The determination of concentration is made by measurement of the peak scattered light signal from the cloud of growing droplets which is a function of both the droplet concentration and chamber supersaturation. Because the formation of the peak is related to the rate of growth of the droplets and sedimentation, both of which are determined by supersaturation, the system calibration can be uniquely determined by comparison with an absolute counter such as a static diffusion chamber with a photographic recording system. T.M.

N82-15395*# Naval Research Lab., Washington, D. C.

DESCRIPTION OF THE NRL ISOTHERMAL HAZE CHAMBER

William A. Hoppel *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 42-43 ref Sponsored in part by the Naval Air Systems Command (For primary document see N82-15383 06-35)
Avail: NTIS HC A13/MF A01 CSCL 14B

In the IHC the critical supersaturation is inferred from the measurement of the size of particles which have grown to their equilibrium size at exactly 100 percent RH. The largest size channel corresponds to a critical supersaturation of 0.014 percent. The growth time required for particles of this size to reach their equilibrium size exceeds the 110 second residence time in the IHC. Since the supersaturation spectrum is always very steep in this region, the contribution of these larger particles which have not yet attained their equilibrium size to smaller size channels is negligible. However, failure of these particles to reach their equilibrium size could result in a significant lowering of the count

in the size channel corresponding to the smaller critical supersaturation. T.M.

N82-15396*# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
MODIFIED MEE INDUSTRIES STATIC THERMAL GRADIENT DIFFUSION CLOUD CHAMBER
Randolph D. Borys *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 44-45 (For primary document see N82-15383 06-35)
Avail: NTIS HC A13/MF A01 CSCL 14B

The experiments performed at the Workshop were undertaken to confirm the calculated sample volume, determine the usable range of supersaturation, and minimum detectable size. Comparison of absolute CCN concentrations with other state-of-the-art continuous flow diffusion chambers at supersaturations near 1 percent indicated that the volume used produced CCN concentrations well within the range of CCN concentrations determined at the workshop. This agreement is interpreted to mean the sample volume was correct. Direct measurements of the beam geometry done in the laboratory indicated a factor of 4-5 error. This error is apparently due to the larger apparent visible beam diameter versus the actual usable beam diameter given the droplet illumination, chamber optical geometry, microscope optics and film characteristics. T.M.

N82-15397*# Desert Research Inst., Reno, Nev.
SIMULTANEOUS OPERATION OF THREE CCN COUNTERS AND AN ISOTHERMAL HAZE CHAMBER AT THE 1980 INTERNATIONAL CCN WORKSHOP
James G. Hudson, C. F. Rogers, and G. Keyser *In its* The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 46-53 refs (For primary document see N82-15383 06-35)
(Contract NAS8-33820; Grant NSF ATM-79-21558)
Avail: NTIS HC A13/MF A01 CSCL 14B

Four devices were operated for the detection and characterization of cloud condensation nuclei (CCN) and fog condensation nuclei (FCN). In chronological order of development, the CCN devices are the conventional continuous-flow diffusion chamber (CFD), the rapid-cycle CCN spectrometer, and the instantaneous CCN spectrometer. The FCN detection device is an isothermal haze chamber (IHC). These four instruments are discussed and general comments on their performance at the workshop are given. T.M.

N82-15398*# Desert Research Inst., Reno, Nev.
STEADY GENERATION OF AEROSOLS WITH AN IMPROVED CONSTANT OUTPUT ATOMIZER
Jack Y. Dea and Ulrich Katz *In its* The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 54-56 ref (For primary document see N82-15383 06-35)
(Contract NAS8-33820; Grant NSF ATM-79-21558)
Avail: NTIS HC A13/MF A01 CSCL 14B

It is common practice to generate laboratory aerosols of soluble materials with pneumatic atomizers. In a typical device, a solution of the substance to be aerosolized is injected into a jet of air and the liquid is broken up into very small droplets. After forced evaporation, a dry aerosol of the solute is produced. A number of commercially available devices were tested, and despite differences in design, all the atomizers tested suffered from short- and/or long-term fluctuations of their output particle number concentrations. The mechanisms responsible for atomizer instabilities are discussed and methods for alleviating these problems are considered. T.M.

N82-15399*# State Univ. of New York, Albany. Atmospheric Sciences Research Center.
CCN COMPARISONS OF STATIC DIFFUSION CHAMBERS
James E. Jiusto, R. E. Ruskin (Naval Research Lab.), and A. Gagin (Hebrew Univ.) *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 57-63 refs (For primary document see N82-15383 06-35)
Avail: NTIS HC A13/MF A01 CSCL 14B

Nine CCN counters of the static diffusion (SDC) type were compared with one another and with continuous flow diffusion (CFD) chambers. The nine SDCs showed a considerable amount of variation, largely attributable to newness and/or lack of prior calibration of some units. The five more consistent instruments agreed quite well, to within at least 20 percent of the NRL mobility analyzer and to within 10 percent at 1 percent supersaturation. There was satisfactory agreement between the more reliable SDC and CFD chambers. Author

N82-15400*# State Univ. of New York, Albany. Atmospheric Sciences Research Center.
CCN-SUPERSATURATION SPECTRA SLOPES (K)
James E. Jiusto and G. Garland Lala *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 64-68 refs (For primary document see N82-15383 06-35)
(Contract DAAG29-81-K-0019; Grant NSF ATM-76-24048-02)
Avail: NTIS HC A13/MF A01 CSCL 14B

Theoretically the slope k of a CCN-supersaturation spectrum should equal two thirds of the slope of the total (soluble) aerosol size distribution. Workshop results tended to verify this relation. The k values are markedly different depending on whether one is measuring ambient CCN concentrations at supersaturations S above or below approximately 0.1-0.2%. The larger k values for S approximately $< 0.1\%$ is consistent with the greater decrease in large particle concentration with increasing size. It is concluded that over the S range of 0.02% to 2%, two power fits (and k values) may sometimes suffice for a reasonable approximation of the CCN distribution. At other times, and with laboratory generated aeosols, such an approach is inadequate and requires refinement. T.M.

N82-15401*# Naval Research Lab., Washington, D. C.
MEASUREMENT OF THE AEROSOL SIZE DISTRIBUTION WITH NRL'S MOBILITY ANALYZER
William A. Hoppel *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 69-78 refs Sponsored in part by the Naval Air Systems Command (For primary document see N82-15383 06-35)
Avail: NTIS HC A15/MF A01 CSCL 14B

The size distribution was measured in the size range between 0.0057 and 0.57 micrometer radius. A description of the instrumentation and data analysis is given, together with the measured size distributions calculated for 23 experiments. T.M.

N82-15402*# Desert Research Inst., Reno, Nev.
PERFORMANCE OF THE CONTINUOUS FLOW DIFFUSION CHAMBERS
James G. Hudson and Darryl J. Alofs (Missouri Univ., Rolla) *In its* The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1982 p 79-84 ref (For primary document see N82-15383 06-35)
Avail: NTIS HC A13/MF A01 CSCL 14B

A brief comparative description is made of the chambers. Overall, comparisons for the various types of experiments - monodisperse, polydisperse and ambient aerosol - showed agreement among these chambers to within 15% in most cases. A careful analysis of the results indicated that a proper accounting of certain parameters would bring about much closer agreement among four of these instruments. T.M.

N82-15403*# Naval Research Lab., Washington, D. C.
REVIEW OF ISOTHERMAL HAZE CHAMBER PERFORMANCE
J. W. Fitzgerald, C. F. Rogers (Desert Research Inst.), and J. G. Hudson (Desert Research Inst.) *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 85-92 refs (For primary document see N82-15383 06-35)
(Contract NAS8-33820; Grant NSF ATM-79-21558)
Avail: NTIS HC A13/MF A01 CSCL 14B

The theory of this method of characterizing cloud condensation nuclei (CCN) over the critical supersaturation range of about 0.01% to 0.2% was reviewed, and guidelines for the design and operation of IHC's are given. IHC data are presented and critically analyzed. Two of the four IHC's agree to about 40% over the entire range of critical. a third chamber shows similar agreement with the first two over the lower part of the critical supersaturation range but only a factor of two agreement at higher supersaturation. Some reasons for the discrepancies are given. T.M.

N82-15404*# Desert Research Inst., Reno, Nev.
AEROSOL GENERATION AND DISTRIBUTION SYSTEM FOR THE THIRD INTERNATIONAL CLOUD CONDENSATION NUCLEI WORKSHOP
Ulrich Katz and Jack Y. Dea *In its* Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 93-96 refs (For primary document see N82-15383 06-35)
(Contract NAS8-33820; Grant NSF ATM-79-21558)
Avail: NTIS HC A13/MF A01 CSCL 14B

In order to obtain identical samples participating CCN instruments and aerosol characterizing equipment were located along and connected to a 8.2 cm diameter aluminum tube through which the test aerosols were pumped directly from the source at very slight overpressure. Of the total of 29 experiments, 18 were carried out with artificial NaCl or (NH4)2SO4 aerosols. These were generated from salt solutions by pneumatic atomizers of special design to ensure high constancy of the aerosol output concentration. In three experiments with insoluble CCN (AgI, paraffin wax) the aerosols were generated thermally. In some of the tests, an electrostatic classifier was used for narrowing the particle size distributions. T.M.

N82-15405*# Florida State Univ., Tallahassee. Dept. of Meteorology.
ELEMENTAL COMPOSITION OF AEROSOLS IN FOURTEEN EXPERIMENTS OF THE CLOUD CONDENSATION NUCLEI WORKSHOP
William H. Mach and Richard R. Hucek *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 97-98 refs (For primary document see N82-15383 06-35)
(Contract NAS8-33820; Grant NSF ATM-79-21558)
Avail: NTIS HC A13/MF A01 CSCL 14B

Aeosols were collected with two Ci impactors and analyzed with proton induced X-ray emission (PIXE) for chemical composition and to detect if contamination was present. One of the impactors sampled the generated aerosols; the other impactor sampled droplets from a diffusion cloud chamber. The purpose of the experiments was to test the feasibility of a study of the transfer of chemical elements from the fine particle sizes to the coarse particle sizes, after CCN are activated and cloud droplets are formed. The data indicated that sulfur-containing aerosols did exhibit the expected transfer. T.M.

N82-15406*# Desert Research Inst., Reno, Nev.
COMPARISON BETWEEN TWO AITKEN COUNTERS AND WITH CLOUD CONDENSATION NUCLEI COUNTERS AT THE 1980 INTERNATIONAL CCN WORKSHOP
C. F. Rogers and R. L. McKenzie (NBS, Washington, D.C.) *In its* The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 99-107 refs (For primary document see N82-15383 06-35)
(Contract NAS8-33820; Grant NSF ATM-79-21558)
Avail: NTIS HC A13/MF A01 CSCL 14B

The Pollak and the TSI 3020 counters agreed to within about 10% at concentrations below 1000 cu cm, whereas above that concentration, substantial systematic differences were observed. When the test aerosol was monodisperse and the CCN counters were operated at supersaturations that should nucleate all the aerosol, the Pollak counter read about 6% to 20% lower than the CCN counter in the concentration range from 250/cu cm to 1800/cu cm. The TSI 3020 read about 20% lower than the CCN counter at concentrations less than 1000/cu cm, and a factor of about two higher at concentrations above 1000/cu cm. T.M.

N82-15407*# Wyoming Univ., Laramie.
COMPARING DRY AEROSOL SIZE MEASUREMENTS
David C. Rogers *In* Desert Research Inst. The Third Intern. Cloud Condensation Nuclei Workshop Nov. 1981 p 106-107 refs (For primary document see N82-15383 06-35)
Avail: NTIS HC A13/MF A01 CSCL 14B

Two instruments were used to size dry aerosols for the CCN experiments: the Naval Research Laboratory (NRL) instrument which uses an electrical mobility analyzer to separate the aerosol size fractions and a diffusion chamber to grow and count the particles and the University of Wyoming (WYO) aerosol monitoring system. Measurements from these two systems were usually found to be in agreement during the CCN Workshop. Two examples are presented to compare aerosol size distribution measurements of the two instruments: experiment 8 (monodisperse NaCl) and experiment 27 (polydisperse AgI). Differential (dN/dR) and cumulative plots are shown for both instruments for experiment 8 and experiment 27; also shown are Aitken particle measurements for comparison. T.M.

N82-15408*# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
ADVANCED MICROWAVE MOISTURE SOUNDER (AMMS) FOR WB-57F CCOPE MISSION Final Technical Report, 3 Apr. - 31 Oct. 1981
J. A. Gagliano and J. J. McSheehy Oct. 1981 48 p refs
(Contract NAS5-26528)
(NASA-CR-166752; A-2904) Avail: NTIS HC A03/MF A01 CSCL 14B

The AMMS, flown on the WB-57F Cooperative Convective Precipitation Experiment (CCOPE), collected data at three bands on either side of the 183.3 GHz water vapor line at + or - 2.25, + or - 5.00, and + or - 8.75 GHz. Data were also collected simultaneously at a single low-loss atmospheric window channel near 94 GHz. The AMMS scanner imaged the scene below the WB-57F over an angular range of + or - 45 degree about nadir with beam-widths of 2 degree and 1 degree for the 94 GHz and 183 GHz sensors, respectively. The radiometer system operated under control of the onboard microcomputer used to: store radiometric data on the AMMS flight recorder, operate the stepper motor driven scanner, and collect pertinent housekeeping data for the system. A portable ground support system was used following each CCOPE flight to provide quick-look data analysis. The CCOPE flight logs and tape of the AMMS data were delivered to NASA. A.R.H.

N82-15409# NETZSCH-Geraetebau G.m.b.H., Selb (West Germany).
DEVELOPMENT OF A PROTOTYPE OF A TEST APPARATUS FOR THE DETERMINATION OF THE THERMAL CONDUCTIVITY IN SOLIDS, ON POWDERS AND FOAMS Final Report
Karl Bayreuther Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 49 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-052; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10,30

The measuring methods required for the determination of thermal conductivity cross wire and parallel, are applied in the laboratories already for a long time, the cross wire method mainly for insulating materials, the parallel method for good heat conductors. The measuring principle of both methods is the same. From the temperature distribution of a sample heated constantly from the interior, the thermal conductivity is calculated, in the instationary methods in dependence of defined times. For tests to 1500 C the measuring arrangement is put into a furnace. The aim of the development intent should be the commercialization, automation and combination of the measuring methods. The constructed apparatus fulfills the required conditions. To generate the necessary test temperature a special chamber furnace is used, where measurements according to both methods can be carried out. The measuring run-off is controlled by a computer, data acquisition and data processing take place automatically. The measuring results are registered by a plotter in a data print out and shown in graphs. In several examples the function capacity of the apparatus has been approved. Author

N82-15410# Erlangen-Nuremberg Univ. (West Germany). Lehrstuhl und Lab. fuer Technische Elektronik.
DIGITAL RECORDING OF VIDEO SIGNALS ON MAGNETIC TAPE AT 40 M biT/SEC Final Report, Dec. 1979
Norbert Bauer Bonn Bundesministerium fuer Forschung und Technologie May 1981 16 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-084; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 3,40

Video signals can be recorded at a data rate of 40 Mbit/sec on a modified helical recorder (GPR, GRUNDIG). The approach realized runs at a data rate of 30 Mbit/sec. The video signal is sampled at a rate of 10 MHz and quantized into 64 amplitude levels. A data compression ratio of 2 is achieved by a special DPCM system which causes little error propagation. Simple track is replaced by a double track, requiring the same space on the magnetic tape. A.R.H.

N82-15411# Siemens A.G., Munich (West Germany). Work fuer Integrierte Schaltungen.

IMPROVEMENTS OF PROXIMITY EXPOSURE TECHNIQUE FOR SMALLER LARGE-SCALE INTEGRATION PATTERN Final Report, Jun. 1980

Guenter Doemens, Bodo Dreisbach, Erich Rosshaupter, Dusan Sofronijevic, Hans Udo Sygulla, and Guenter Winterhalter Bonn Bundesministerium fuer Forschung und Technologie Apr. 1981 91 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-072; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19,16

The technique was improved from 5 micrometers to 3-3.5 micrometers resist pattern in the manufacturing process. The technological limits of this technique for light were estimated at 2 micrometers in the laboratory and 2.5 micrometers in production. Because of the lack of a suitable photo resist for wavelength approximately = 200 nm, these limits cannot be used in manufacturing. A prototype development for automatic wafer alignment reached its goals. The wafer distortion is found to be relatively small, nearly linear, isotropic, and it can be compensated. T.M.

N82-15412# Tuebingen Univ. (West Germany). Inst. fuer Angewandte Physik.

ELECTRON OPTICAL MASK PROJECTOR WITH A PHOTOCATHODE FOR MINIATURIZATION Final Report, Dec. 1980

Gottfried Moellenstedt, Rumold Speidel, Michael Dostmann, Fritz Martin, and Max Mayr Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 107 p refs In GERMAN; ENGLISH Summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-089; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22,50

The projector was developed with an image converter consisting of a masked photocathode and a plane anode grid. The mask structure to be demagnified is on a quartz glass plate in a thin layer of TiO2 strongly absorbing ultraviolet light. A photoemissive layer is deposited by evaporation on the whole front side of the plate. For the demagnification of the electron image of the mask, a system is used consisting of two geometrically similar magnetic lenses in a telescopic arrangement. T.M.

N82-15413# Siemens A.G., Berlin (West Germany). Research Labs.

ELECTRON RADIATION SYSTEMS FOR STRUCTURE PRODUCTION. PART 1: PHYSICAL FOUNDATIONS AND EXPERIMENTAL RESULTS Final Report, Mar. 1980

Klaus Anger, Juergen Frosien, Burkhard Lischke, and Hans Schuster-Woldan Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 102 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie 2 Vol.

(BMFT-FB-T-81-090-Vol-1; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21,40

Microlithograph processes are required to manufacture VLSI semiconductors which are capable of producing extremely fine structures. Reducing electron projection systems were examined for this purpose. On the basis of theoretical considerations concerning the resolution and number of image elements, a reducing electron projector with a scale of 1:4 was developed. The imaging system with corrected compound optics has an optical capability of 37,000 resolvable lines per image field, and a distortion of 0.4 %. The exposure time required for electron lithographic production of 1 micron structures on 8 mm by 8 mm fields is around 2.5 s/sq cm. A highly accurate method of adjustment was developed for the illumination and imaging system. This is essential to reproducible generation of structures by an electron projection system. A new alignment method which yields a registration accuracy of 0.1 micron for multilayer exposures was demonstrated. N.W.

N82-15414# Siemens A.G., Berlin (West Germany). Forschungslab.

ELECTRON RADIATION SYSTEM FOR STRUCTURE PRODUCTION. PART 2: EQUIPMENT SYSTEMS AND DESIGN Final Report, Mar. 1980

Guenter Friedrich, Guenther Gorges, Burkhard Lischke, Reinhold Schmitt, and Mathias Sturm Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 198 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie 2 Vol.

(BMFT-FB-T-81-091-Vol-2; ISSN-0340-7608) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 36,30

The physical foundation for the development of a microprojector is presented and the results achieved with this equipment are described. The basic considerations concerning the design of the mechanical and electronic equipment are discussed. New types of electron-optical lenses for wide beam diameters, precision systems for positioning the mask with respect to the wafer, and electronic measuring systems for highly accurate adjustment of the beam were developed. Structures with minimum sizes of 0.3 micrometers can by produced over image fields of 8 by 8 sq mm. The registration accuracy in the case of multi-layer exposures is 0.1 micrometers. T.M.

N82-15415# Optische Werke G. Rodenstock, Munich (West Germany).

DEVELOPMENT OF A PROCESS CAMERA LENS WITH VARIABLE FOCAL LENGTH Final Report

Hans Grumpelt, Peter Hanke, Ernst Rothe, Manfred Schuck, Walter Smilga, and Hermann Walter Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 93 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-155; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19,40

Process cameras of today are equipped exclusively with fixed focal length lenses. The development of a process lens with variable focal length is described. The design principles of its optical, mechanical, and electronic groups of components are explained. The prototype of the new lens reaches the image quality of fixed focal length lenses. Author

N82-15416# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).

DATA EVALUATION AND DATA PROCESSING OF THE LOW-ENERGY PARTICLE SPECTROMETER E8 ON BOARD THE HELIOS PROBES Final Report, Dec. 1980

Klaus Richter, Gerhard Umlauft, and Erhard Keppler Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 77 p refs In GERMAN; ENGLISH summary Sponsored in cooperation with Max-Planck-Gesellschaft

(Contracts BMFT-RS-10/7; BMFT-01-QC-076A-ZA-WRS-0108) (BMFT-FB-W-81-035; ISSN-0170-1339) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16,20

The production of the HELIOS-E8-data is described along with their handling on ground. Software routines necessary to evaluate the data are described. Numerous examples are given. Author

N82-15417# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Brunswick (West Germany). Abteilung Kreiselgeraete und Traegheitsortung.

RESEARCH ON MAGNETO-OPTICAL BIAS ELEMENTS FOR LASER GYROS Final Report

Rolf Gauert Apr. 1981 58 p refs In GERMAN; ENGLISH summary

(DFVLR-FB-81-21) Avail: NTIS HC A04/MF A01; DFVLR,

Cologne DM 15,60

Different magnetooptical bias techniques for laser gyros are discussed. The magnetic mirror in the configuration of the transverse Kerr-effect and the Faraday cell with ferromagnetic garnets in an external resonator are examined theoretically and experimentally. The magnetic mirror delivers acceptable results at the wavelength of 1.153 microns and the Faraday cell in the external resonator delivers good results at the wavelength of 0.633 microns. The calculations for the Faraday-mirror (which in principle is a Faraday cell) are promising. Other magnetooptical methods are discussed briefly. M.G.

N82-15418# Sydney Univ. (Australia). Coastal Studies Unit.
CALIBRATION AND DATA CORRECTION PROCEDURES FOR FLOW METERS AND PRESSURE TRANSDUCERS COMMONLY USED BY THE COASTAL STUDIES UNIT
P. Nielsen and P. J. Cowell Jul. 1981 39 p refs
(Grant N00014-80-G-0001; NR Proj. 388-157)
(AD-A105594; CSU-TR-81/1) Avail: NTIS HC A03/MF A01 CSCL 14/2

This report describes calibration procedures and results for two types of instruments commonly used by the Coastal Studies Unit: a bidirectional ducted flow meter and a strain gage pressure transducer. These instruments each constitute a system comprising a sensor head which issues a pulsating signal and a control box which electronically integrates the pulses into an analogue voltage which is then recorded. It is the response characteristics of these systems as a whole that are examined herein. GRA

N82-15419# Brookhaven National Lab., Upton, N. Y. National Synchrotron Light Source.
ULTRA-HIGH-VACUUM DOUBLE-AXIS GONIOMETER FOR USE WITH AN ELECTRON SPECTROMETER
Mark Shleifer and Gwyn P. Williams 1981 8 p Presented at the 2d Natl. Conf. on Synchrotron Radiation Instr., Ithaca, N.Y., 15-17 Jul. 1981
(Contract DE-AC02-76CH-00016)
(DE81-028470; BNL-29850; CONF-810750-2) Avail: NTIS HC A02/MF A01

A double-axis goniometer designed for moving and indexing an electron spectrometer for angle-resolved photoemission studies is described. A feature of the design is that the two rotations operate independently and either can be carried out with the analyzer at any position. The goniometer is designed to be installed in a 14 in spool piece which makes it possible to add it to an existing 14 in uhv system. DOE

N82-15420# Oak Ridge National Lab., Tenn.
SYSTEMS BACKGROUND IN X-RAY MICROANALYSIS
James Bentley 1981 11 p refs Presented at the 3rd Analytical Electron Microscopy Workshop, Vail, Colo., 13 Jul. 1981
(Contract W-7405-eng-26)
(DE81-027285; CONF-810740-2) Avail: NTIS HC A02/MF A01

X-ray systems background in analytical electron microscopes are discussed. Methods of reducing or eliminating these sources are presented. DOE

N82-15421# Los Alamos Scientific Lab., N. Mex.
INSTRUMENT FOR LIQUIDS, AMORPHOUS AND POWER DIFFRACTION
Alan K. Soper 1981 13 p refs Presented at a Symp. on Neutron Scattering, Argonne, Ill., 12-14 Aug. 1981
(Contract W-7405-eng-36)
(DE81-030135; LA-UR-81-2531; CONF-810840-4) Avail: NTIS HC A02/MF A01

A time-of-flight diffractometer, which has been built at the Los Alamos pulsed neutron source, is described. The concept of resolution focusing is discussed and the application of the instrument to liquid structure over a broad range of momentum transfers is presented. DOE

N82-15422# Stanford Linear Accelerator Center, Calif.
DESIGN AND PERFORMANCE OF THE NEW CATHODE READOUT PROPORTIONAL CHAMBERS IN LASS
G. Aiken, D. Aston, W. Dunwoodie, W. B. Johnson, A. Kilert, D. W. G. S. Leith, D. McShurley, B. Ratcliff, R. Richter, S. Suzuki et al Oct. 1980 28 p refs Presented at the IEEE Nucl. Sci. Symp., Orlando, Fla., 5 Nov. 1980 Prepared in cooperation with Carleton Univ. and Nagoya Univ.
(Contract DE-AC03-76SF-00515)
(DE81-028097; SLAC-PUB-2642; CONF-801103-63) Avail: NTIS HC A03/MF A01

The design and construction of a new proportional chamber system for the LASS spectrometer are discussed. This system consists of planar and cylindrical chambers employing anode wire and cathode strip readout techniques. The good timing characteristics of anode readout combine with the excellent spatial resolution of cathode readout to provide powerful and compact detectors. Preliminary resolution data are presented along with operating characteristics of the various devices. DOE

N82-15423# Brookhaven National Lab., Upton, N. Y.
MULTIPARTICLE MAGNETIC SPECTROMETER WITH dE/dx AND TRD PARTICLE IDENTIFICATION
S. J. Lindenbaum (City College of New York) and R. S. Longacre 1981 11 p refs Presented at the Phys. Opportunities at ISABELLE Summer Workshop, Upton, N.Y., 20 Jul. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030567; BNL-29990; CONF-81075) Avail: NTIS HC A02/MF A01

Fast high resolution magnetic multiparticle spectrometers with excellent particle tracking, momentum measurement, and identification capability are described. These techniques are applied here primarily for design of spectrometers for low p sub t and other physics (at moderate and even high p sub t) in the ISABELLE small angle hall. DOE

N82-15424# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
PRODUCTION AND USE OF HIGH-GRADE SILICON-DIODE TEMPERATURE SENSORS
J. Sondericker 1981 8 p Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10-14 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030547; BNL-30005; CONF-810835-25) Avail: NTIS HC A02/MF A01

The development and application of silicon diode temperature sensors for cryogenic applications in ISABELLE is described. Selection of a stable silicon diode showing minimal junction voltage drop is discussed. A calibration cryostat consisting of an evacuated pot suspended in a liquid helium filled Dewar was constructed, and used to calibrate the sensors. The performance of 600 commercial and in house sensors used in ISA projects shows a failure rate of less than 1 per cent. Problems associated with cryogenic thermometry falling short of catastrophic failure are discussed. DOE

N82-15425# California Univ., Livermore. Lawrence Livermore Lab.
HYPER-FILTER-FLUORESCER SPECTROMETER FOR FUSION X-RAY DIAGNOSTICS
C. L. Wang 16 Jun. 1981 6 p refs Presented at the 10th European Conf. on Controlled Fusion and Plasma Phys., 14-19 Sep. 1981
(Contract W-7405-eng-48)
(DE81-029867; UCRL-86163; CONF-810906-7) Avail: NTIS HC A02/MF A01

The filter fluorescer spectrometer is a powerful tool for measuring X-ray spectrum from high fluence X-ray sources. However, this technique is limited to energies less than 120 keV, because there are no practical absorption edges available above this energy. A new method of utilizing the filter fluorescer system for X-ray spectral measurement above 120 keV is presented. The new apparatus is called hyper-filter-fluorescer spectrometer. DOE

N82-15426# California Univ., Livermore. Lawrence Livermore Lab.
DESIGN OF NEUTRON STREAK CAMERA FOR FUSION DIAGNOSTICS
C. L. Wang, R. Kaligjian, and M. S. Singh 16 Jun. 1981 5 p refs Presented at the 10th European Conf. on Controlled Fusion and Plasma Phys., Moscow, 14-19 Sep. 1981
(Contract W-7405-eng-48)
(DE81-029866; UCRL-86162; CONF-810906-6) Avail: NTIS

HC A02/MF A01

The design of a neutron detector of 20 ps resolving time is described. It is used to study the history of fusion burn. DOE

N82-15427# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.

HIGH-SPEED PHOTOGRAPHIC OBSERVATION OF PLASMA-LIMITER INTERACTIONS IN ISX-B

R. E. Clausing, L. C. Emerson, and L. Heatherly 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9-12 Aug. 1981

(Contract W-7405-eng-26)

(DE81-029669; CONF-810831-52) Avail: NTIS HC A02/MF A01

High speed motion pictures confirm that arcing occurs in the ISX-B limiter during periods of plasma instability. Various types of plasma/limiter interactions are described and illustrated. Arcing and other visible phenomena are correlated to plasma parameters. DOE

N82-15428# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.

LABORATORY AND FIELD PORTABLE SYSTEM FOR CALIBRATING AIRBORNE MULTISPECTRAL SCANNERS

W. W. Kuhlow 1981 5 p Presented at the SPIE Intern. Symp., San Diego, Calif., 24 Aug. 1981

(Contract DE-AC08-76NV-01183)

(DE81-029740; EGG-1183-1777; CONF-810810-23) Avail: NTIS HC A02/MF A01

A calibration and alignment system for airborne multispectral scanners which permit the procedures to be carried out in about two to three hours is described. This equipment can be quickly disassembled, transported with the scanner in all but the smallest single engine aircraft, and reassembled in a few hours. The subsystems of this equipment are commonly available from manufacturers of optical and electronic equipment. The other components are easily purchased, or fabricated. The scanner discussed is the Model DS-1260 digital line scanner. It is a dual-sensor system which is operated in one of two combinations of sensors: one spectrometer head (which provides simultaneous coverage in ten visible channels) and one thermal infrared detector, or simply two thermal infrared detectors. DOE

N82-15429# Technische Hochschule, Aachen (West Germany). Inst. fuer Strahlantriebe und Turboarbeitsmaschinen.

OPTIMIZATION OF MEASUREMENT SIGNAL PROCESSING AND DATA ACQUISITION FOR THE LASER TWIN FOCUS VELOCIMETER [OPTIMIERUNG DER MESSSIGNALAUFBEREITUNG UND DER DATENSAMMLUNG FUER DAS LASER-ZWEI-FOKUS-GESCHWINDIGKEITSMESSVERFAHREN]

U. Schricker Jul. 1979 57 p refs In GERMAN

(Mitt-79-04) Avail: NTIS HC A04/MF A01

A laser twin-focus velocimeter was developed and automated for turbomachine applications. The required measuring time is substantially reduced. Optimization of signal processing speeds up measuring by a factor of 10. A special buffer storage system improves data recording. The adjustment and waiting periods are considerably shortened by automation. In rotating systems the measuring time is reduced by a factor of 20 using the velocimeter continuously instead of stroboscopically.

Author (ESA)

N82-15430# Valvo G.m.b.H., Hamburg (West Germany). Roehren- und Halbleiterwerke.

PHOTOLITHOGRAPHIC PROCESSES FOR SMALL STRUCTURES: INTRODUCTION AND TRIAL OF ELECTRON BEAM LITHOGRAPHY Final Report, Nov. 1979

Wolfgang Doerner, Andreas Hupe, Juergen Kaeker, Ralf Kastmann, and Gerd Leschke Bonn Bundesministerium fuer Forschung und Technologie Dec. 1980 140 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-80-199; ISSN-0340-7608) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 29,40

Electron beam lithography was introduced for mask making in very large scale integration circuits. The vector-scan electron beam pattern generator Philips EBPG3 is described. The appropriate process line and the test patterns were followed by an extensive representation of mask processes for several electron-sensitive resists. Two programs that convert pattern data from the computer aided design format into the EBPG format as well as exposure experiments on silicon slices are described. Advantages as compared to light optics are more flexibility in producing circuits, shorter mask making time, and lower mask defect density. Author (ESA)

N82-15431# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.

THE FAINT OBJECT CAMERA (FOC): EUROPEAN INSTRUMENT ASSOCIATED WITH THE SPACE TELESCOPE [LA FAINT OBJECT CAMERA (FOC.) INSTRUMENT EUROPEEN ASSOCIE AU SPACE TELESCOPE]

Michel Saisse 1981 21 p In FRENCH Presented at Reunion Franco-Sovietique, Moscow 16-22 Mar. 1981

Avail: NTIS HC A02/MF A01

The FOC instrument characteristics which are designed to be installed in orbit at the back of the space telescope after rendezvous with a space shuttle are discussed. The FOC consists of two cameras that operate respectively with apertures of F/96 and F/48; each camera has its own photodetector. The detectors are two dimensional and are linked with an optical system whose resolution is limited by diffraction. The five observational modes of the FOC are described. Besides the F/96 and F/48 optical modes, a high resolution (F/288, supplementing the F/96 mode with a Cassegrain system) mode, a coronagraphic mode, and a spectrographic mode are available. Author (ESA)

N82-15432# Research Inst. of National Defence, Linkoeping (Sweden). Huvudandelning 3.

FIELD TESTS OF A THORN EMI ACOUSTIC CAMERA USED IN AN UNDERWATER ACOUSTIC TELEVISION SYSTEM [AKUSTISK BILDSENSOR FOER UNDERVATTENSBRUK. LAEGESRAPPORT 1981-04-30. FAELTFOERSOEK MED AKUSTISK KAMERA, TYP THORN-EMI]

Ludvig Mossberg Aug. 1981 106 p refs In SWEDISH; ENGLISH summary

(FOA-C-30225-E1) Avail: NTIS HC A06/MF A01

A very large number of pictures were registered on videotape. The subjective impression of an acoustic image was judged to be as important as quantitative analysis of such features as: target detectability, range of the system, resolution, detectable target contrasts as seen by the camera, etc. Although laboratory conditions did not exist at the test site a number of interesting conclusions were derived from the picture tapes and are discussed. The Thorn-EMI Technical Specification for the system is fulfilled. T.M.

N82-15433# Radian Corp., Austin, Tex.

RESPONSE FACTORS OF VOC ANALYZERS AT A METER READING OF 10,000 ppmV FOR SELECTED ORGANIC COMPOUNDS Final Report, Dec. 1980 - Feb. 1981

D. A. DuBose Mar. 1981 30 p refs

(Contract EPA-68-02-3171)

(PB81-234817; EPA-600/2-81-051) Avail: NTIS HC A03/MF A01 CSCL 13B

A reinterpretation of data generated in a laboratory study of the sensitivity of two types of portable hydrocarbon detectors to a variety of organic chemicals is summarized. Detector sensitivity is quantified by a response factor for each chemical where the response factor equals the actual concentration of the chemical divided by the observed concentration from the detector. Response factors estimated for a 10,000 ppmv detector reading are presented. The instruments were calibrated to 7993 ppmv methane gas. GRA

N82-15434# Dudley Observatory, Albany, N.Y.

THE TAPERED ELEMENT OSCILLATING MICROBALANCE: A MONITOR FOR SHORT-TERM MEASUREMENT OF FINE AEROSOL MASS CONCENTRATION Final Report, Oct. 1977 - Dec. 1980

Harvey Patashnick and Georg Rupprecht Aug. 1981 41 p refs

(Grant EPA-R-805222)

(PB81-245219; EPA-600/2-81-146) Avail: NTIS

HC A03/MF A01 CSCL 14B

An instrument for short-term monitoring of ambient aerosol fine mass concentration was developed based on a device called a tapered element oscillating microbalance (TEOM). The detector consists of a tapered hollow tube fixed at the wide end and holding an exchangeable filter cartridge at the narrow end. Air is drawn through the filter cartridge down the hollow tube. Particulates deposit on the filter cartridge. The tapered tube is maintained in continuous oscillation in a clamped-free mode whose frequency is accurately monitored. As particulates load on the filter cartridge, the frequency changes in relation to the mass added. A microprocessor-based electronics system collects and processes the data. Output is printed in a format consisting of time and aerosol concentration level in microgram/cu m. GRA

N82-15435# North Carolina State Univ. at Raleigh.
PHOTOACOUSTIC DETECTION OF PARTICULATE CARBON
Charles A. Bennett and Richard R. Patty Aug. 1981 52 p refs
(Contract EPA-R-805332)
(PB81-245425; EPA-600/7-81-129) Avail: NTIS HC A04/MF A01 CSCL 14B

A photoacoustic technique for the mass monitoring of carbonaceous aerosols deposited on filter substrates was developed. The technique involves the use of a specially designed photoacoustic cell. Photoacoustic response is calibrated as a function of elemental carbon loading using laboratory-generated elemental carbon standards. The nature of the photoacoustic response is examined at several chopping frequencies using these calibration standards, and the physical principles necessary for an adequate interpretation of the experimental results is presented in detail. Practical considerations concerning ambient carbon monitoring are outlined; in particular, the perturbation due to the presence of scattering particulates is examined and limited experimental quantification of this perturbation is reported. GRA

N82-15436# National Bureau of Standards, Washington, D.C.
DIMENSIONS, VOLUME 65, NUMBER 3
Apr. 1981 29 p refs
(PB81-235053; NBS-DIM-65-3) Avail: NTIS HC A03/MF A01 CSCL 14B

This monthly magazine features short summaries of major technical developments, highlights of work in progress, major speeches and statements by Bureau management, and a listing of NBS publications. Topics discussed are issue swinging to the Earth's tilt, testing for technical competence, physics at the measurement limits, new parameter proposed for fracture toughness, evaluation of solar collector cover plates, and improved modeling of cement and concrete, fire development in basement rooms, and generation and measurement of DC electric field with space charges. Author

36 LASERS AND MASERS

Includes parametric amplifiers.

N82-15437# Siemens A.G., Munich (West Germany). Forschungslab.
OPTICAL PUMPED NEODYMIUM MINIATURE LASER TRANSMITTER Final Report, Oct. 1978
Siegfried Geckeler, Wolfgang Kruehler, Hans F. Mahlein, Rolf Plaettner, Gerhard Schiffner, Lutz Vite, and Gerhard Winzer Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 173 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-095; ISSN-0340-7608) Avail: NTIS HC A08/MF A01

The preparation and the properties of the most important stoichiometric Nd laser materials and miniature lasers made from them are considered as well as calculations for pumping these lasers with LEDs and for coupling them to the modulator. Both optical communication systems and the rival merits of neodym solid-state lasers and semiconductor lasers are considered. The following results are of particular interest: miniature lasers for 1.06 micrometer and in some cases for 1.32 micrometer fabricated from NdP5O14, NdAl3(BO3)4 and LiNd(PO3)4 with mirrors directly applied to their endfaces allowing CW operation at room temperature. The LNP laser with 1 mW threshold, 6% differential efficiency and a threshold pump power density of 4 kW/cu cm offers the best performance. The electrooptical coefficient expected for NdAl3(BO3)4 on the basis of lattice symmetry was found to be < 0.6 x 10 to the -12 power m/V. The Nd laser transmitter can be expected to cost considerably more than the future INGAP semiconductor laser transmitter. Author

N82-15438# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 1: Physics.
THE SIGNAL TO NOISE RATIO OF A HETERODYNE LASER DETECTION SYSTEM
K. W. Getreuner Mar. 1980 90 p refs In DUTCH; ENGLISH summary
(Contract A77/KL/052)
(PHL-1980-11; TDCK-73843) Avail: NTIS HC A05/MF A01

The analysis of expected signal and noise powers as features of a continuous CO2 laser heterodyne detection system is described. Quantative calculations were performed for systems which are presently under construction. Only additive noise was considered. The impact on the system of detector characteristics is highlighted. In order to determine the equivalent electronic networks for two available detectors, impedance measurements were carried out. An analysis was made about the expected accuracy of range measurements based on amplitude modulation of the laser beam. Both sinus wave as well as binary pseudo noise code modulation techniques are considered. Expressions were derived for the minimum measuring time as a function of, e.g., the standard deviation of the range accuracy. A detailed analysis is given of the signal to noise aspects of the quadratic demodulation technique. T.M.

N82-15439# Siemens A.G., Munich (West Germany). Forschungslab.
LASER DIODE Final Report, May 1980
Klaus Mettler, Karl-Heinz Zschauer, Hans-Dietrich Wolf, and Wolfgang Endler Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 78 p refs In GERMAN; ENGLISH summary
(BMFT-FB-T-81-151; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16,40

Stable, profitable, narrow proton and oxide stripe lasers were fabricated from multiple layers of (Ga,Al)As by the dimensioning of the structure based on a two dimensional mathematical model. They operated satisfactorily in the experimental system at data rates of 560 Mbit/s. Accelerated degradation tests gave extrapolated life times for room temperature operation in excess of 100,000 hours. Furthermore, three index guided laser structures (BH, CSP and RIG) were tested (In,Ga)(As,P)/InP multilayers were fabricated and tested by using broad mesa lasers. T.M.

N82-15440# California Univ., Livermore. Lawrence Livermore Lab.
COMPACT 36 kJ ELECTRON BEAM SYSTEM FOR LASER PUMPING
L. G. Schlitt 31 May 1981 16 p Presented at the 3rd IEEE Intern. Pulsed Power Conf., Albuquerque, N.Mex., 1-3 Jun. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE81-024375; UCRL-85665; CONF-810659) Avail: NTIS A02/MF A01

An electron beam machine consisting of six modules is being constructed for the B amplifier of a KrF laser system. Each module consists of a diode, a 5 omega positive charged water dielectric Blumlein pulse forming line, and a five stage Marx generator. Separate 25 cm by 41 cm electron beams are formed in magnetically isolated diodes which when arranged in groups of three produce two nearly continuous 25 cm by 125 cm beams that enter the laser cell from opposite sides. The pulse forming lines operate at 450 keV and Produce 150 ns long pulses. The lines employ electrically triggered annular SF6 output switches. The two concentric transmission lines of each pulse forming line are charged in 1 microsec through symmetric circuits

to reduce diode prepulse voltage. The six modules together with the laser cell occupy less than 15 sq m of floor space. DOE

N82-15441# Los Alamos Scientific Lab., N. Mex.
STATUS OF THE FREE-ELECTRON LASER EXPERIMENT AT LOS ALAMOS
Roger W. Warren (Westinghouse Research Lab.), Charles A. Brau, Brian E. Newman, William E. Stein, John G. Winston, and Lloyd M. Young 1981 19 p refs Presented at the Workshop on Free Elect. Lasers, Sun Valley, Idaho 22-25 Jun. 1981 Sponsored in part by ARPA, AFOSR, and Navy Air Systems Command
(Contract W-7405-eng-36)
(DE81-020132; LA-UR-81-2568; CONF-8106145-2) Avail: NTIS HC A02/MF A01

Main design parameters are presented for the accelerator, the laser, and the wiggler. Features of the design, construction, alignment, and diagnostic parts of the experiment are discussed. Performance characteristics of the components are described. DOE

N82-15442# California Univ., Livermore. Lawrence Livermore Lab.
ABERRATIONS AND FOCUSABILITY IN LARGE SOLID-STATE-LASER SYSTEMS
W. W. Simmons 1981 25 p refs Presented at the SPIE Intern. Symp., San Diego, Calif., 24-28 Aug. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE81-029914; UCRL-85645; CONF-810810-26) Avail: NTIS HC A02/MF A01

Solid state lasers for fusion experiments must reliably deliver maximum power to small (approximately .5 mm) targets from stand-off focal distances of 1 m or more. This requirement places stringent limits upon the optical quality of the several major components - amplifiers, Faraday isolators, spatial filters - in each amplifier train. Residual static aberrations in optical components are transferred to the beam as it traverses the optical amplifier chain. Although individual components are typically less than lambda/20 for components less than 10 cm clear aperture; and less than lambda/10 for components less than 20 cm clear aperture; the large number of such components in optical series results in a wavefront error that may exceed one wave for modern solid state lasers. Specific examples of the performance of large aperture components are presented. Design requirements upon the larger aperture Nova laser components, up to 74 cm in clear aperture are also discussed. T.M.

N82-15443# Los Alamos Scientific Lab., N. Mex.
USE OF ZERNIKE POLYNOMIALS AND INTERFEROMETRY IN THE OPTICAL DESIGN AND ASSEMBLY OF LARGE CARBON-DIOXIDE LASER SYSTEMS
V. K. Viswanathan 1981 10 p refs Presented at the Spie 25th Anniv. Celebration, San Diego, Calif., 24-28 Aug. 1981
(Contract W-7405-eng-36)
(DE81-030138; LA-UR-81-2524; CONF-81810-24) Avail: NTIS HC A02/MF A01

The need for non-raytracing schemes in the optical design and analysis of large carbon-dioxide lasers like the Gigawatt, Gemini, and Helios lasers currently operational at Los Alamos, and the Antares laser fusion system under construction is described. The scheme currently used at Los Alamos involves characterizing the various optical components with a Zernike polynomial set obtained by the digitization of experimentally produced interferograms of the components. A Fast Fourier Transform code then propagates the complex amplitude and phase of the beam through the whole system and computes the optical parameters of interest. The analysis scheme is illustrated through examples of the Gigawatt, Gemini, and Helios systems. A possible way of using the Zernike polynomials in optical design problems of this type is discussed. Comparisons between the computed values and experimentally obtained results are made and it is concluded that this appears to be a valid approach. DOE

N82-15444# Los Alamos Scientific Lab., N. Mex.
OPTICAL TOOLING FOR ANTARES
Walter Bauke, Albert C. Saxman, and Noel OKay 1981 9 p Presented at the Conf. on Optics '81, Los Alamos, N. Mex., 6 Apr. 1981
(Contract W-7405-eng-36)
(DE81-030256; LA-UR-81-2469; CONF-810429-39) Avail: NTIS HC A02/MF A01

The Antares laser system is a large (40 kJ) CO2 pulse laser system. High energy pulses are transmitted between buildings over path lengths exceeding 90 m. The optical elements are contained within large steel assemblies (power amplifiers, turning chambers, and target chamber) which must be positioned with tolerances of 0.75 mm. The subassemblies of optical components must be prepositioned to a precision of 0.25 mm. This precision can easily be obtained by first order surveying techniques and instrumentation. The use of a combination of traditional surveying techniques and modern optical tooling methods throughout the integration of building reference planes and the erection of major steel assemblies are described. The design and measured assembly tolerances are compared. DOE

N82-15445# Los Alamos Scientific Lab., N. Mex.
PHASE ABERRATIONS AND BEAM CLEANUP TECHNIQUES IN CARBON-DIOXIDE LASER FUSION SYSTEMS
V. K. Viswanathan 1981 6 p refs Presented at the SPIE 25th Anniv. Celebration, San Diego, Calif., 24-28 Aug. 1981
(Contract W-7405-eng-36)
(DE81-030139; LA-UR-2523; CONF-810810-25) Avail: NTIS HC A02/MF A01

The various carbon dioxide laser fusion systems at Los Alamos are described from the point of view of an optical designer. The types of phase aberrations present in these systems, as well as the beam cleanup techniques that can be used to improve the beam optical quality, are discussed. T.M.

N82-15446# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
NOBLE GAS HALOGEN LASER INDUCED FLUORESCENCE OF BENZENE: SOME OF ITS DERIVATIVES, DIFLUOROMETHYL RADICALS; AND CARBON MONOXIDE Thesis - Georg-August-Univ. [MIT EINEM EDELGAS-HALOGEN-LASER INDUZIERTE FLUORESZENZ VON BENZOL, EINIGEN SEINER FLUORDERIVATE, DEM DIFLUORMETHYLENRADIKAL UND KOHLENSTOFFMONOXID]
Walter Langel Dec. 1980 124 p refs In GERMAN
(MPIS-22/1980; ISSN-0436-1199) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21

The dynamics of molecules excited by laser absorption into well defined vibrational states were investigated. An apparatus was built in order to study laser induced fluorescence. A noble gas halogen excimer laser (pulse energy 10 mJ for KrF) was also constructed. Fluorescence of gaseous or liquid substances was examined by a high resolution monochromator, a transient recorder and a computer. Through absorption of the KrF line (248.4 nm) of the excimer laser by benzene and its fluor derivatives, vibrationally excited levels in the first electronically excited singulet state were populated and the concomitant fluorescence was observed and resolved in spectrum and time. Author (ESA)

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N82-15447# Technische Hochschule, Darmstadt. (West Germany). Fachgebeit Mechanische Technologie und Werkzeugmaschinen.
TECHNICAL AND SCIENTIFIC RESEARCH ACCOMPANYING THE PROJECTS ON 'NEEDLE MILLING', INCLUDING THE DETERMINATION OF SPECIFIC PROCESS PARAMETERS Final Report
Hans-Peter Wolf Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 72 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-81-005; ISSN-0171-7618) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West

Germany DM 15,10

The new manufacturing process 'needle milling' was studied The first application is the discharge of surfaces on rolled products, such as sheet metal, pipes, sheet bars, and so on. This machining is to prepare final rolling operations. The methods used today do not meet the demands of humane working conditions (noise, dust, refinish by hand, pickling, pollution). The application of needle milling seems to be an effective alternative. On testing the applications in cooperation with industrial enterprises, the fundamentals of needle milling were defined and further possibilities of application were found. Author

N82-15448# Technical Research Centre of Finland, Espoo. Metallilab.

ON THE EFFECTS OF THE POST-FABRICATION TREATMENT METHODS FOR WELDED STAINLESS STEELS

Juho Hakala and Tuula Purra Jan. 1981 40 p refs In FINNISH; ENGLISH summary Original contains color illustrations

(VTT-83; ISBN-951-38-1178-6; ISSN-0355-6395) Avail: NTIS HC A03/MF A01

Different chemical and mechanical cleaning techniques were applied to manual and MIG welded joints of stainless steels. The materials used were AISI 304, 316 and 321. The efficiency of the different cleaning techniques and the appearance of the surface were determined. The corrosivity of the methods in microscale was characterized. The corrosion behavior of the treated welds were tested by measuring the corrosion potential and the potential where an increase in the corrosion current can be seen on the anodic polarization curve. T.M.

N82-15449# California Univ., Livermore. Lawrence Livermore Lab.

EVALUATION OF SHIELDED METAL ARC AND FLUX CORED METAL ARC WELDING CONSUMABLES FOR FABRICATION OF STAINLESS STEEL MAGNET CASES FOR 4K SERVICE

E. N. C. Dalder, O. W. Seth (Chicago Bridge and Iron Co.), and T. A. Whipple (NBS, Boulder, Colo.) 30 Jul. 1981 15 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10-14 Aug. 1981

(Contract W-7405-eng-48)

(DE81-028851; UCRL-85564; CONF-810835-5) Avail: NTIS HC A02/MF A01

Of three highly restrained shielded metal arc (SMA) welds made in the flat position with large diameter Type E316L-15 welding electrodes supplied by different vendors, two welds showed adequate combinations of 4K tensile and K sub IC properties to be considered for use in manufacture of mirror fusion test facility (MFTF-B) superconducting magnet-cases. The poor performance of the third SMA weld is explainable, in part, by a combination of higher ferrite level and N2 concentration than in the other two SMA welds. Despite presence of undissolved metallic flux-constituents and porosity in a Type 316L flux cored metal arc weld, its 4K K sub Ic would be adequate for use on (MFTF-B). However, its 4K sigma y was slightly below MFTF-B requirements. DOE

N82-15450# Maschinenfabrik K. Walter, Munich (West Germany).

DEVELOPMENT OF A MEASURING, CONTROL, AND REGULATION UNIT FOR A CYLINDER TURNING MACHINE Final Report

Ernst Ettl Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 20 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-106; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 4,20

A control unit for high-precision lathes for turning rotogravure cylinders is described. A measuring system for determining cylinder diameter, a bearing control system connecting cross feed and measuring system, controlled magnetic bearings, and a control system for longitudinal traverse and cross feed were developed. Free programmable control is employed. J.D.H.

N82-15451# Societe Nationale Industrielle Aerospatiale, Suresnes (France). Lab. Central.

SAFETY, RELIABILITY, COST REDUCTION: PERMANENT OBJECTIVES OF THE MODERN AEROSPACE INDUSTRY AND HOW STUDIES IN TRIBOLOGY CONTRIBUTE TO THE FORMULATION OF FUTURE SOLUTIONS [SECURITE, FIABILITE, REDUCTION DES COUTS: OBJECTIFS CONSTANTS DE L'INDUSTRIE AEROSPATIALES MODERNE. COMMENT LES ETUDES DE TRIBOLOGIE PARTICIPENT A L'ELABORATION DES SOLUTIONS DE DEMAIN]

M. Armbruster 4 Feb. 1981 22 p In FRENCH Presented at Journees ISF Conf. on the Lutte contre le Frottement et l'Usure, ses Objectifs pour Demain, 6 Nov. 1980

(SNIAS-812-551-111; C.42-031) Avail: NTIS HC A02/MF A01

Advances in aircraft R and D are discussed. Tribology is of special importance in the following areas: aircraft brakes, contact corrosion, rotor hubs, the functioning of transmissions after lubricant breakdown, and diagnostic methods. Applications for different fields of aeronautics are: problems with missiles and launch vehicles, problems with satellites, problems with aircraft, and problems with helicopters. Friction and wear are of constant concern and special attention is paid to self lubricating bearings and in-service wear detection (ferrography). Author (ESA)

N82-15452# Ricardo & Co., Engineers (1927) Ltd., Shoreham-by-Sea (England).

THE UTILISATION OF ALCOHOL IN LIGHT DUTY DIESEL ENGINES Final Report

28 May 1981 41 p refs Sponsored by EPA

(PB81-244469; EPA-460/3-81-010; DP-81/935) Avail: NTIS HC A03/MF A01 CSCL 21G

Various approaches employed to facilitate the utilization of alcohols, methanol and ethanol, in light duty diesel engines were reviewed. The choice of which system to employ is most heavily influenced by the proportion of alcohol substitution which is required and the resulting engine first cost penalty which is deemed to be acceptable. Alcohol utilization by more or less conventional spark ignited engines appears to be far less problematical than conversion of diesel engines. GRA

N82-15453# Department of Energy, Bartlesville, Okla. Energy Technology Center.

AUTOMOTIVE FUEL ECONOMY: POTENTIAL IMPROVEMENT THROUGH SELECTED ENGINE AND DIFFERENTIAL GEAR LUBRICANTS Final Report

Ted M. Naman Jul. 1981 50 p refs

(Contract DO-SC-RA-78-19)

(PB81-240467; DOT-TSC-NHTSA-81-8; DOT-HS-805895) Avail: NTIS HC A03/MF A01 CSCL 21G

The effects of four engine lubricants and three differential gear lubricants on the fuel economy of two 1978 automobiles operated at 20F, 70F, and 100F ambient temperatures are evaluated. The engine lubricants were evaluated using the 1978 Federal Test procedure and steady state tests from a cold start. The gear lubricants were evaluated in steady state operation from a cold start. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N82-15454# Los Alamos Scientific Lab., N. Mex.

FAILURE MODE ANALYSIS USING STATE VARIABLES DERIVED FROM FAULT TREES WITH APPLICATION

Robert J. Bartholomew 1981 11 p refs Presented at the ANS/ENS Topical Meeting on Probabilistic Risk Assessment, Port Chester, N.Y., 20-24 Sep. 1981

(Contract W-7405-eng-36)

(DE81-030239; LA-UR-81-2595; CONF-810905-3) Avail: NTIS HC A02/MF A01

Fault Tree Analysis (FTA) is used extensively to assess both the qualitative and quantitative reliability of engineered nuclear

power systems employing many subsystems and components. FTA is very useful, but the method is limited by its inability to account for failure mode rate of change interdependencies (coupling) of statistically independent failure modes. The state variable approach (using FTA derived failure modes as states) overcomes these difficulties and is applied to the determination of the lifetime distribution function for a heat pipe thermoelectric nuclear power subsystem. Analyses are made using both Monte Carlo and deterministic methods and compared with a Markov model of the same subsystem. DOE

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N82-15455*# National Aeronautics and Space Administration, Washington, D. C.

CHARACTERISTICS FOR CALCULATING PARTS MADE OF REINFORCED PLASTICS

Yu. M. Tarnopolskiy and A. V. Roze Aug. 1981 392 p refs Transl. into ENGLISH of the book "Osobennosti Rascheta Detaley iz Armirovanykh Plastikov" Riga, Zinatne, 1969 p 1-272 Translation was announced as N75-77572 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-3198)

(NASA-TM-75915) HC A17/MF A01 CSCL 20K

The construction, properties and regulation of the anisotropy of reinforced plastics is discussed. Weak displacement resistance and expansion compression perpendicular to the direction of reinforcement are emphasized. Traditional problems of the resistance of materials and applied theory of elasticity (rods, plates, thick walled rings) are examined. Experimental material obtained during the testing of referenced fiberglass plastic material with a fibrous, laminated, and spatially joined structure is included. S.L.

N82-15456*# Computer Sciences Corp., Hampton, Va. System Sciences Div.

NASTRAN USER'S GUIDE (LEVEL 17.5)

E. I. Field, D. N. Herting, and M. J. Morgan Washington NASA Jun. 1979 552 p ref Prepared for Universal Analytics, Inc. (Contract NAS1-12969)

(NASA-CR-3146) Avail: NTIS HC A24/MF A01 CSCL 20K

The user's guide is a handbook for engineers and analysts who use the NASTRAN finite element computer program supplements the NASTRAN Theoretical Manual (NASA SP-221), the NASTRAN User's Manual (NASA SP-222), the NASTRAN Programmer's Manual (NASA SP-223), and the NASTRAN Demonstration Program Manual (NASA SP-224). It provides modeling hints, attributes of the program, and references to the four manuals listed. A.R.H.

N82-15457# Fraunhofer-Inst. fuer Betriebsfestigkeit, Darmstadt (West Germany).

INFLUENCE OF THROAT AND PLATE THICKNESS ON THE FATIGUE STRENGTH OF FILLET WELDS

E. Haibach, R. Olivier, and W. Ritter 1981 69 p refs In GERMAN; ENGLISH summary

(LBF-FB-131) Avail: NTIS HC A04/MF A01

An investigation was carried out aiming at the influence of throat and plate thickness on fatigue strength of fillet welds with fatigue critical toe. The statistical test program refers to angular fillet welds made from steel MRSt 37-2 and includes twelve fabrication variants. The fillets were welded in the horizontal or flat position under a mixed gas atmosphere by means of the M.A.G. welding process: in the case of 10 mm plate thickness as single pass with 4 mm throat thickness and with case of 50 mm plate thickness as flat faced fillets by multiple pass with 20 mm or 35 mm throat thickness. At all considered variants, the fatigue strength decreased with increasing plate and throat thickness. Hot spot strain measurements made at the toe of the welds indicated that this was largely due to a geometric size effect which for fillet welds with a throat thickness of 4 mm, 20 mm and 35 mm implied a reduction of tolerable nominal stress with a ratio of 1 : 0.75 : 0.67. T.M.

N82-15458# Technische Universitaet, Hanover (West Germany). Inst. fuer Konstruktion und Statik der Schiffe.

CATALOG OF EFFECTIVE WIDTH AND ULTIMATE LOADS OF LONGITUDINALLY STIFFENED PLATES [KATALOG MITTRAGENDER BREITEN UND TRAGLASTENLAENGSGEDRUECKTER, VERSTEIFTER PLATTENFELDER (BERECHNUNGSKONZEPT)]

K. Hutschenreiter Bonn Bundesministerium der Verteidigung. 1981 109 p refs In GERMAN; ENGLISH summary

(BMVG-FBWT-81-9) HC A06/MF A01

Diagrams were used to determine the effective width and ultimate loads for eccentrically stiffened plates. The influence of plates and stiffeners were separated for numerical calculations. The effective widths were plotted dependent upon residual stresses, predeformations and lateral loads for the axially loaded plates with the aspect ratios 1/b = 2, 3 and 4. Simplified formulas (Perry-Robertson) are presented for the effective width and collapse of longitudinally stiffened plates. The effects of strain and bend of eccentric stiffeners, predeformations and plate buckling were considered. The reduced section modulus and ultimate moment of a ship's hull was calculated. For gamma/gamma * < or less than 1, the permissible loads of the linear theory are greater than the ultimate loads of the imperfect structure. As a result, it is unsafe to calulate with gamma/gamma * = 1. Gamma/gamma * should be 4 or 5. A.R.H.

N82-15459# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Cologne (West Germany). Abteilung Betriebsnahe Ermuedungsfestigkeit.

EVALUATION OF THE CRACK INITIATION LIFE BEHAVIOR OF FATIGUE LOADED AUTOMOTIVE COMPONENTS MADE FROM HIGH STRENGTH ALUMINUM ALLOYS Ph.D. Thesis - Technischen Hochschule

Dieter Hanschmann Mar. 1981 189 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-733)

(DFVLR-FB-81-10) Avail: NTIS HC A09/MF A01; DFVLR, Cologne DM 51.50

Since the fatigue process occurs mainly at stress raisers, the local stresses and strains are explicitely determined. Based on the local stresses and strains a cumulative damage analysis was performed. Since the cumulation damage under variable amplitude loading is significantly non-linear, a new damage evaluation concept is proposed which especially accounts for the load sequence effects. The analytical prediction method was applied together with several automotive companies. T.M.

N82-15460# Northwestern Univ., Evanston, Ill.

FINITE-ELEMENT PROGRAM FOR CREEP ANALYSIS OF CONCRETE STRUCTURES

Zdenek P. Bazant, Edwin C. Rossow, and Geir Horrigmoe (Pavlo Multiconsult A.S.) 1981 8 p refs Presented at 6th Intern. Conf. on Struct. Mech. in Reactor Technol., Paris, 17 Aug. 1981 Prepared for Oak Ridge National Lab.

(Contract W-7405-eng-26)

(DE81-028071; CONF-810801-57) Avail: NTIS HC A02/MF A01

A new finite element program for the analysis of creep effects in concrete structures, is described. The program represents an extension of the general purpose finite element code NONSAP. The program uses a rate type creep law based on expanding the relaxation function in Dirichlet series. The creep law is linear, the aging is accounted for, and the temperature effects on creep rate as well as the rate of aging are considered. Material properties can be input either as empirical creep test data or as the double power law for creep. The program can automatically set up the creep parameter from partial empirical information. The program uses a step by step integration in time. DOE

N82-15461# Brown Univ., Providence, R. I. Div. of Engineering.

ESTIMATE OF THE CONTRIBUTION OF LOAD TRANSFER TO THE YIELD STRENGTH AND HARDNESS OF A DUAL-PHASE STEEL

J. Gurland Jun. 1981 14 p refs Presented at the Conf. on Effects of Interfaces on Deformation and Fracture, Louisville, Ky., 11 Oct. 1981
(Contract DE-AC02-80ER-10556)
(DE81-025545; COO-3084-83; CONF-811022-1) Avail: NTIS HC A02/MF A01

The ratio of the average stresses in ferrite and martensite at yield of a dual phase steel was calculated from a shear lag model of load transfer, based on a shape parameter of the martensite particles. A stress ratio of 2.2 is determined for a specific steel. This value is compared to the stress ratio obtained from hardness and microhardness determinations. The results qualitatively and tentatively support the strengthening role of load transfer in dual phase steels. DOE

N82-15462# Sandia Labs., Albuquerque, N. Mex.
PRESSURE-SHEAR LOADING OF MATERIALS
L. C. Chhabildas and J. W. Swegle 1981 4 p refs Presented at the 8th AIRAPT Conf. and the 19th EHPRG Conf., Uppsala, 17 Aug. 1981
(Contract DE-AC04-76DP-00789)
(DE81-028250; SAND-81-0378C; CONF-810827-7) Avail: NTIS HC A02/MF A01

A novel technique involving the use of Y-cut quartz crystals for simultaneous dynamic longitudinal and shear loading of materials is described. The coupled longitudinal and shear motion generated within the Y-cut crystal (upon impact) is transmitted into a sample bonded to its rear surface and is monitored using velocity interferometer techniques. Experimental results on pressure shear loading of aluminum and alumina-filled epoxy are given. DOE

N82-15463# Sandia Labs., Albuquerque, N. Mex.
THERMAL-FATIGUE PROPERTIES OF COATED MATERIALS FOR FUSION-DEVICE APPLICATIONS
A. W. Mullendore, J. B. Whitley, and D. M. Mattox 1981 10 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract DE-AC04-76DP-00789)
(DE81-028367; SAND-81-0230C; CONF-810831-21) Avail: NTIS HC A02/MF A01

The adherence of plasma sprayed coatings on substrates was evaluated in a pulsed electron beam, thermal fatigue environment. The materials are candidates for application as limiter and armor components of Tokamak fusion devices. Materials were tested both in the as-sprayed condition and after hot isostatic pressing (HIP) to increase coating density. Some showed good survivability in both the as-sprayed and HIP densified conditions. DOE

N82-15464# California Univ., Livermore. Lawrence Livermore Lab.
AXISYMMETRIC FINITE DEFORMATION MEMBRANE PROBLEMS
William W. Feng 12 Dec. 1980 4 p ref Presented at the Symp. on Fluid Mech. of Combust. Systems, Boulder, Colo., 22-24 Jun. 1981
(Contract W-7405-eng-48)
(DE81-030070; UCRL-85278; CONF-810621-6) Avail: NTIS HC A02/MF A01

The general formulations for solving a class of axisymmetric membrane problems are presented. The material nonlinearity, as well as the geometric nonlinearity, is considered. One method solves a set of differential equilibrium equations. The governing equations are reduced to three first order ordinary differential equations with explicit derivatives. The Ritz method, where a general potential energy functional valid for all axisymmetric deformed positions is presented. The geometric admissible functions that govern the deformed configuration are written in terms of a series with unknown coefficients. These unknown coefficients are determined by the minimum potential energy principle that of all geometric admissible deformed configurations, the equilibrium configuration minimizes the potential energy. DOE

N82-15465# URS/Blume (John A.) and Associates, San Francisco, Calif.
EXPERIMENTAL AND THEORETICAL STUDY OF A TALL BUILDING SUBJECTED TO WIND LOADING
R. S. Mills 1981 9 p refs Presented at the 4th Natl. Conf. on Wind Eng. Res., Seattle, 26 Jul. 1981
(Contract DE-AC08-81NV-10145)
(DE81-029478; CONF-810742-2) Avail: NTIS HC A02/MF A01

Full-scale experimental observations of the wind-induced response of a building of moderate height show that dynamic considerations may be negligible for stress analysis of alongwind response. For analysis of a cosswind response and human perception, however, dynamic relatonships must be accurately modeled. The contribution of torsional response is also significant and may be produced by aerodynamic properties even when the building system appears to be structurally symmetric. Predictions of alongwind response of the building obtained from a developed analytical procedure show reasonable agreement with observed response. DOE

N82-15466# California Univ., Livermore. Lawrence Livermore Lab.
FREE-SURFACE VELOCITY MEASUREMENTS OF PLATES DRIVEN BY REACTING AND DETONATING RX-03-BB AND PBX-0404
L. M. Erickson, H. G. Palmer, N. L. Parker, and H. C. Vantine 13 Jul. 1981 6 p refs Presented at the APS Conf. on Shock Waves in Condensed Matter, Menlo Park, Calif., 23-25 Jun. 1981
(Contract W-7405-eng-48)
(DE81-026776; UCRL-86372; CONF-810684-50) Avail: NTIS HC A02/MF A01

Copper plates 90 mm in diameter, of thickness 0.25 mm and 0.5 mm, were accelerated by an adjacent 17 mm thick cylinder of RX-03-BB or PBX-9404-03. The explosvie was initiated by impact of a thick flyer from the LLNL 102 mm gun, providing either a reactive or fully detonating wave, by appropriate choice of flyer velocities up to 1.30 mm/micros. The free surface velocity of the plates were measured with a Fabry-Perot velocimeter. Excellent experimental free-surface velocity histories were obtained. Calculations of this history employing beta-burn and nucleation and growth high explosives models are in good agreement with fully detonating experiments. For reacting RX-03-BB, adjustments in the parameter are needed. The experimental technique gives records whose agreement with calculation is sensitive of the model and is therfore a good way of testing new high explosive models. Also, this method allows one to infer information about the reaction zone length. DOE

N82-15467# Sandia Labs., Albuquerque, N. Mex.
DYNAMIC SHEAR-WAVE VELOCITY MEASUREMENTS USING INTERFEROMETRIC TECHNIQUES
L. C. Chhabildas 1981 14 p refs Presented at the Intern. Congr. on Instrumentation in Aerospace Simulation Facilities, Dayton, Ohio, 30 Sep. 1981
(Contract DE-AC04-76DP-00789)
(DE81-026973; SAND-81-1135C; CONF-810939-1) Avail: NTIS HC A02/MF A01

An optical technique using velocity interferometers to determine the particle velocity changes associated with plane shear wave propagation is described. Two velocity interferometers are used to monitor different diffracted laser beams from a surface which undergoes both longitudinal and shear motion. Fringes produced in the interferometer are proportional to a linear combination of both the longitudinal and shear components of the free surface velocity. By obtaining two different recordings of the motion, the two components can be separated. Examples of shear wave interferometry applications are reported. DOE

N82-15468# Vereinigte Flugtechnische Werke-Fokker G.m.b.H., Bremen (West Germany).
CALCULATION OF THE STRESS-STRAIN EVOLUTION OF A PRESSURE-LOADED TRAPEZOID ALUMINUM BEAM BEFORE AND AFTER REACHING ELASTIC LIMIT [DIE RECHNERISCHE BESTIMMUNG DES KRAFT-VERSCHIEBUNGS-VERLAUFES EINES DRUCKBELASTETEN TRAPEZFOERMIGEN ALU-TRAEGERS NACH ERREICHEN DER TRAGLAST]
Ekkehard Schneider 28 Oct. 1980 64 p refs In GERMAN (Ek47-059-80) Avail: NTIS HC A04/MF A01

The stress/strain diagram for a statically compression loaded trapezoidal aluminum beam was calculated to predict load bearing capacity. The calculation was carried out by a dynamic SLOW-RAMP method using the finite element program MARC. It is shown that a particular damping behavior has to be chosen, and that the applied deformation velocities have a clear influence on the value of the loading capacity (elastic limit). The calculated values and test data are compared and the suitability of the SLOW-RAMP method is shown. Author (ESA)

N82-15469# Fraunhofer-Inst. fuer Betriebsfestigkeit, Darmstadt (West Germany).
EFFECT OF GAS PORES FROM SHOP-PRIMED PLATE MATERIAL ON THE FATIGUE STRENGTH OF LONGITUDINAL FILLET WELDS
R. Olivier and W. Ritter 1981 49 p refs In GERMAN; ENGLISH summary
(LBF-FB-160(1981)) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 40

Welding of shop-primed plate-materials usually leads to the formation of porosity defects by arising gas bubbles penetrating through the weld metal. These gas pores especially occur in fillet welds and may even reach the weld surface. The effect of gas pores of different size and density on the fatigue strength of fillet welds loaded in the longitudinal direction was examined. In contrast to fillet welds lying transversely to the loading direction, the portion of areas of gas pores or clustered pores to the whole load-carrying cross section remains largely irrelevant for fillet welds lying in the loading direction. The parameters in welding and finishing techniques are included under statistical aspects thus allowing generalized conclusions to be drawn on the fatigue behavior of longitudinal fillet welds with gas pores. The fatigue strength of longitudinal fillet welds with or without gas pores does not differ remarkably, although the pores prove to be the fatigue critical detail independently from their size. Author

N82-15470# Kernforschungszentrum, Karlsruhe (West Germany).
LOCALIZED LOADS APPLIED TO SHELLS OF REVOLUTION
L. Depmeier (Erlangen-Nuernberg Univ., West Germany), D. Lambrecht (Erlangen-Nuernberg Univ., West Germany), and W. Nevermann (Erlangen-Nuernberg Univ., West Germany) Sep. 1980 164 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(KfK-CAD-155) Avail: NTIS HC A08/MF A01

The most important papers concerning thin shell theory, attempts of solution, and experimental investigations are summarized and evaluated. The development and testing of computer programs which are convenient for the calculation of stresses from local loadings in cylindrical, spherical and conical shells is discussed. The results achieved with these programs are demonstrated. A parametric study was conducted for the loading of a cylinder by a longitudinal moment acting on a rectangular area. The results are shown in diagrams which allow a fast evaluation of the occurring stresses. Author

N82-15471# Kernforschungszentrum, Karlsruhe (West Germany).
CALCULATION OF THE STRESSES AND THE FINITE DEFLECTIONS OF A PERFECT CIRCULAR CYLINDER SUBJECTED TO NON-AXISYMMETRIC LOADS
M. Esslinger (DFVLR, Brunswick), K. Kretschel (DFVLR, Brunswick), and H. W. Melzer (DFVLR, Brunswick) Aug. 1980 48 p refs In GERMAN; ENGLISH summary
(KfK-CAD-165; GL-DFL/100) Avail: NTIS HC A03/MF A01

A computation procedure for solving nonlinear shell equations in the case of nonaxisymmetric loading is presented. In the circumferential direction the state variables are expanded into Fourier series. In the direction of the meridian a segmentation method is applied. The transfer matrices are established by means of collocation. The application of the procedure is demonstrated by presenting several examples. Author

N82-15472# Southampton Univ. (England). Inst. of Sound and Vibration Research.
USING THE ENVELOPE OF RESONANCE PEAKS TO ESTIMATE POWER ABSORBED BY A FINITE STRUCTURE
R. J. Pinnington Mar. 1981 40 p refs Sponsored by Admiralty Marine Technology Establishment
(ISVR-TR-115) Avail: NTIS HC A03/MF A01

An absorbed vibration power measuring method applicable when a structure is sufficiently lightly damped for the vibrations to be governed by modal behavior is presented. Power input to the structure is found by measuring the power absorbed by each vibrational mode which is calculated from the resonance peak value of the point, or transfer inertance at selected points and the acceleration spectra at these points, measured under normal operating conditions. Cubic spline curves fitted through the resonance peak inertance values estimate power levels between resonances. It is found that the method is accurate in resonance regions, but not in the troughs between resonances. Author (ESA)

N82-15473# Illinois Univ. at Urbana-Champaign. Structural Research Lab.
RESPONSE OF REINFORCED CONCRETE PLATE-COLUMN CONNECTIONS TO DYNAMIC AND STATIC HORIZONTAL LOADS
Denby G. Morrison and Mete A. Sozen Apr. 1981 266 p refs
(Grant NSF PFR-78-16318)
(PB81-237380; Structural-Research-Ser-490; UILU-ENG-81-2004; NSF/CEE-81024) Avail: NTIS HC A12/MF A01 CSCL 13M

The response of interior reinforced concrete plate column connections was investigated. Eight specimens were tested statically and dynamically. Other experimental variables were reinforcement ratio and the amount of superimposed vertical load. The statically tested specimens provided information on the influence of the change in reinforcement ratio and the amount of superimposed vertical load on the response to horizontal loading. An analysis model was developed to interpret the results from the statically tested specimens. The dynamically tested specimens were used to obtain data on the response of the specimens, the observed hysteresis, and calculated damping. GRA

42 GEOSCIENCES (GENERAL)

N82-15474# Water Research Centre, Stevenage (England).
RESEARCH PROGRAMME 1981/82 Progress Report
1981 32 p
Avail: NTIS HC A03/MF A01

Water management projects are outlined. The following propertis are investigated: surface water quality (toxicity, biodegradability, aquatic biology); drinking water quality; water treatment (inorganic, organic compounds, disinfection, instrumentation); distribution systems; sewerage systems; waste water treatment (economic aspects, pollution, pathogens, odor control); sludge utilization; groundwater and river pollution; tidal waters; instrumentation and computing. Author (ESA)

N82-15475# Water Research Centre, Stevenage (England).
[ACTIVITIES AND ACCOUNTS REPORT] Annual Report, 1980-1981
1981 40 p refs
Avail: NTIS HC A03/MF A01

Research projects in water science are reported. The following subjects were investigated: sewers (inspection, rehabilitation, renovation, hydraulic performance, structural capabilities); water mains (joints, pipes, leakage control, quality problems); water quality; health factors (pollution, swimming pool disinfection, nitrates); wastewater treatment and sludge pumping. Author (ESA)

N82-15476# Joint Publications Research Service, Arlington, Va.
USSR REPORT: EARTH SCIENCES, NO. 18
10 Dec. 1981 72 p refs Transl. into ENGLISH from various Russian articles
(JPRS-79631) Copyright. Avail: Issuing Activity

The development of climate and global ecology models and

the predicted effects of a long term warming trend on the climate of the earth are discussed. For individual titles, see N82-15477 through N82-15479.

N82-15477# Joint Publications Research Service, Arlington, Va.
MODEL OF CLIMATE AND GLOBAL ECOLOGY c47
Vladimir Valentinovich Aleksandrov and Nikita Nikolayevich Moiseyev *In its* USSR Rept.: Earth Sci., No. 18 (JPRS-79631) 10 Dec. 1981 p 1-13 refs Transl. into ENGLISH from Priroda (Moscow), no. 9, Sep. 1981 p 68-71 (For primary document see N82-15476 06-42)
Copyright. Avail: Issuing Activity

Requirements for the development of climate and global ecology models are described. The activities of the Club of Rome are reviewed. Global ecological models based on the relationship between human civilization and the dynamic processes taking place in the environment, and requiring the determination of admissable loads on the biosphere, are discussed. Numerical modeling of the cycling of matter in nature, of human activity (based on economic and demographic processes), and climate models is described. J.D.H.

N82-15478# Joint Publications Research Service, Arlington, Va.
POTENTIAL CHANGE IN CLIMATE BY YEAR 2000 c47
O. A. Drozdov *In its* USSR Rept.: Earth Sci., No. 18 (JPRS-79613) 10 Dec. 1981 p 14-15 Transl. into ENGLISH from Novoye, V Zhizni, Nauke, Tekhn., Ser. Nauka o Zemle (Moscow), No. 8, Aug. 1981 p 32-34 (For primary document see N82-15476 06-42)
Avail: Issuing Activity

A warming trend in the climate by the beginning of the next century is postulated. An increase in precipitation in the north and in the subtropics, with an intensification of wind, is predicted. A slight reduction of precipitation in the temperature regions, with an increase in its annual variability, is predicted. J.D.H.

N82-15479# Joint Publications Research Service, Arlington, Va.
CLIMATES OF PAST AS A MODEL OF FUTURE CLIMATE c47
D. D. Kvasov *In its* USSR Rept.: Earth Sci., No. 18 (JPRS-79631) 10 Dec. 1981 p 16-17 Transl. into ENGLISH from Novoye V Zhizni, Nauke Tekhn. Ser. Nauka o Zemle (Moscow), no. 8, Aug. 1981 p 30-32 (For primary document see N82-15476 06-42)
Avail: Issuing Activity

Reasons for assuming an increase in precipitation when there is a climatological warming trend are presented. The effect of a warming trend is predicted to lead to a decrease in the number of icebergs without an increase in ocean level. J.D.H.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.

For instrumentation see *35 Instrumentation and Photography*.

N82-15480*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
DEVELOPMENT AND EVALUATION OF AN AUTOMATIC LABELING TECHNIQUE FOR SPRING SMALL GRAINS Technical Report, 15 Nov. 1979 - 31 Dec. 1980
Eric P. Crist and William A. Malila, Principal Investigators Aug. 1981 67 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract NAS9-15476; Proj. AgRISTARS)
(E82-10001; NASA-CR-161080; SR-EL-04065; ERIM-152400-3-T) Avail: NTIS HC A04/MF A01 CSCL 05A

A labeling technique is described which seeks to associate a sampling entity with a particular crop or crop group based on similarity of growing season and temporal-spectral patterns of development. Human analyst provide contextual information, after which labeling decisions are made automatically. Results of a test of the technique on a large, multi-year data set are reported. Grain labeling accuracies are similar to those achieved by human analysis techniques, while non-grain accuracies are lower. Recommendations for improvments and implications of the test results are discussed. Author

N82-15481*# South Dakota State Univ., Brookings. Remote Sensing Inst.
REMOTE SENSING APPLICATIONS TO RESOURCE PROBLEMS IN SOUTH DAKOTA Annual Progress Report, 1 Jul. 1980 - 30 Jun. 1981
Victor I. Myers, Principal Investigator 30 Jun. 1981 154 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Grant NGL-42-003-007)
(E82-10002; NASA-CR-164892; SDSU-RSI-81-11) Avail: NTIS HC A08/MF A01 CSCL 05A

The procedures used as well as the results obtained and conclusions derived are described for the following applications of remote sensing in South Dakota: (1) sage grouse management; (2) censusing Canada geese; (3) monitoring grasshopper infestation in rangeland; (4) detecting Dutch elm disease in an urban environment; (5) determining water usage from the Belle Fourche River; (6) resource management of the Lower James River; and (7) the National Model Implantation Program: Lake Herman watershed. A.R.H.

N82-15482*# California Univ., Berkeley. Space Sciences Lab.
APPLICATION OF REMOTE SENSING TO SELECTED PROBLEMS WITHIN THE STATE OF CALIFORNIA Annual Report
Robert N. Colwell, Principal Investigator, Andrew S. Benson, John E. Estes, and Claude Johnson 1 May 1981 258 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198. ERTS (Grant NsG-7220)
(E82-10004; NASA-CR-164893; SSL-Ser-22-Issue-18) Avail: NTIS HC A12/MF A01 CSCL 05A

Specific case studies undertaken to demonstrate the usefulness of remote sensing technology to resource managers in California are highlighted. Applications discussed include the mapping and quantization of wildland fire fuels in Mendocino and Shasta Counties as well as in the Central Valley; the development of a digital spectral/terrain data set for Colusa County; the Forsythe Planning Experiment to maximize the usefulness of inputs from LANDSAT and geographic information systems to county planning in Mendocino County; the development of a digital data bank for Big Basin State Park in Santa Cruz County; the detection of salinity related cotton canopy reflectance differences in the Central Valley; and the surveying of avocado acreage and that of other fruits and nut crops in Southern California. Special studies include the interpretability of high altitude, large format photography of forested areas for coordinated resource planning using U-2 photographs of the NASA Bucks Lake Forestry test site in the Plumas National Forest in the Sierra Nevada Mountains. A.R.H.

N82-15483*# General Electric Co., Philadelphia, Pa. Space Div.
LANDSAT-2 AND LANDSAT-3 FLIGHT EVALUATION REPORT, 23 APRIL TO 23 JULY 1979
1 Aug. 1979 258 p ERTS
(Contract NAS5-21808)
(E82-10005; NASA-CR-163348; Doc-79SDS4242) Avail: NTIS HC A12/MF A01 CSCL 05B

The performance of satellite subsystems and the response of in-orbit payload systems are summarized. Graphs and tables show the values of the various parameters of these systems. A spacecraft orbit reference table is included. A.R.H.

N82-15484*# Energy Information Administration, Washington, D.C. Geomagnetic Service.
THE REDUCTION, VERIFICATION AND INTERPRETATION

OF MAGSAT MAGNETIC DATA OVER CANADA Progress Report

R. L. Coles, Principal Investigator, E Dawson, G. V. Haines, G. Jansen vanBeek, J. K Walker, and L. R. Newitt Jul. 1981 3 p Sponsored by NASA ERTS

(E82-10006; NASA-CR-164904; PR-3) Avail: NTIS HC A02/MF A01 CSCL 05B

Magnetic anomalies of lithospheric origin are weak at Magsat altitudes (20 to 30 nT at most), and are easily masked by much larger effects caused by field-aligned and other currents at high latitudes. Most of Canada lies under the influence of ionospheric currents in the auroral zone and polar cap. A more refined selection of quiet Magsat data allowed a revised scalar magnetic anomaly map of the whole region north of about 40 deg N latitude. Very preliminary vector anomaly maps and absolute vector component maps were derived. The scalar magnitudes show great promise for mapping the total force and anomaly fields. The Z vector data also appear to be good. The horizontal X and Y vector data are seriously contaminated with external fields and maybe other effects. A.R.H.

N82-15485*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

WHEAT CULTIVATION: IDENTIFICATION AND ESTIMATION OF AREAS USING LANDSAT DATA [CULTURA DO TRIGO IDENTIFICACAO E AVALIACAO DE AREAS ATRAVES DE DADOS DO LANDSAT]

Nelson deJesusParada, Principal Investigator, Francisco Jose Mendonca, Dall Arthur Cottrell, Antonio Tebaldi Tardin, David Chung Liang Lee, Yosio Edemir Shimabukuro, Mauricio Alves Moreira, and Angela Maria deLimaeFernandoCelsoSoaresMaia May 1981 5 p refs In PORTUGUESE Sponsored by NASA ERTS

(E82-10007; NASA-CR-164905; INPE-2054-RPE/300) Avail: NTIS HC A02/MF A01 CSCL 02C

The feasibility of using automatically processed multispectral data obtained from LANDSAT to identify wheat and estimate the areas planted with this grain was investigated. Three 20 km by 40 km segments in a wheat growing region of Rio Grande do Sul were aerially photographed using type 2443 Aerochrome film. Three maps corresponding to each segment were obtained from the analysis of the photographs which identified wheat, barley, fallow land, prepared soil, forests, and reforested land. Using basic information about the fields and maps made from the photographed areas, an automatic classification of wheat was made using MSS data from two different periods: July to September and July to October 1979. Results show that orbital data is not only useful in characterizing the growth of wheat, but also provides information of the intensity and extent of adverse climate which affects cultivation. The temporal and spatial characteristics of LANDSAT data are also demonstrated.

Transl. by A.R.H.

N82-15486*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

QUANTITATIVE ANALYSIS OF DRAINAGE OBTAINED FROM AERIAL PHOTOGRAPHS AND RBV/LANDSAT IMAGES [ANALISE QUANTITATIVA DA DRENAGEM OBTIDA ATRAVES DE FOTOGRAFIAS AEREAS E IMAGENS DO RBV/LANDSAT]

Nelson deJesusParada, Principal Investigator, Antonio Roberto Formaggio, Jose Carlos Neves Epiphanio, and Mario Valerio Filho May 1981 29 p refs In PORTUGUESE; ENGLISH summary Presented at the 33rd Reuniao Anual de SBPC Sponsored by NASA ERTS

(E82-10008; NASA-CR-164906) Avail: NTIS HC A03/MF A01 CSCL 08H

Data obtained from aerial photographs (1:60,000) and LANDSAT return beam vidicon imagery (1:100,000) concerning drainage density, drainage texture, hydrography density, and the average length of channels were compared. Statistical analysis shows that significant differences exist in data from the two sources. The highly drained area lost more information than the less drained area. In addition, it was observed that the loss of information about the number of rivers was higher than that about the length of the channels. Author

N82-15487*# Massachusetts Univ., Amherst. Dept. of Geology.

THE MINERALOGY OF GLOBAL MAGNETIC ANOMALIES Progress Report, Jan. - Sep. 1981

Stephen E. Haggerty, Principal Investigator 19 Sep. 1981 27 p ERTS

(Contract NAS5-26414)

(E82-10009; NASA-CR-164907) Avail: NTIS HC A03/MF A01 CSCL 08G

Progress is reported in developing predictive abilities to evaluate the potential stabilities of magnetic minerals in the Earth crust and mantle by: (1) computing oxidation state profiling as a function of temperature and pressure; (2) compiling data on basalts to establish validity of the oxidation state profiles; (3) determining Fe-Ni alloys in association with magnetitie as a function of temperature and oxidation state; and (4) acquiring large chemical data banks on the mineral ilmenite which decomposes to mineral spinel in the presence of high sulfur or carbonate environments in the lower crust upper mantle. In addition to acquiring these data which are related to constraining Curie isotherm depths, an excellent correlation was found between MAGSAT anomaly data and the geology of West Africa. A.R.H.

N82-15488*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.

INVESTIGATION OF THE APPLICATION OF REMOTE SENSING TECHNOLOGY TO ENVIRONMENTAL MONITORING

M. L. Rader, Principal Investigator Aug. 1980 76 p ERTS

(Contract NAS9-15800)

(E82-10010; NASA-CR-161071; JSC-16759; LEMSCO-15175) Avail: NTIS HC A05/MF A01 CSCL 13B

Activities and results are reported of a project to investigate the application of remote sensing technology developed for the LACIE, AgRISTARS, Forestry and other NASA remote sensing projects for the environmental monitoring of strip mining, industrial pollution, and acid rain. Following a remote sensing workshop for EPA personnel, the EOD clustering algorithm CLASSY was selected for evaluation by EPA as a possible candidate technology. LANDSAT data acquired for a North Dakota test sight was clustered in order to compare CLASSY with other algorithms.

A.R.H.

N82-15489*# Geological Survey, Denver, Colo.

GEOLOGIC APPLICATIONS OF THERMAL-INERTIA MAPPING FROM SATELLITE Final Report

Terry W. Offield, Principal Investigator, Kenneth Watson, and Susanne Hummer-Miller Jul. 1981 109 p refs Original contains imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (Code 601), Greenbelt, Md. 20771. Domestic users send orders to 'Attn: National Space Science Data Center'; non-domestic users send orders to 'Attn: World Data Center A for Rockets and Satellites'. HCMM

(NASA Order S-40256-B)

(E82-10011; NASA-CR-164818) Avail: NTIS HC A06/MF A01 CSCL 08B

In the Powder River Basin, Wyo., narrow geologic units having thermal inertias which contrast with their surroundings can be discriminated in optimal images. A few subtle thermal inertia anomalies coincide with areas of helium leakage believed to be associated with deep oil and gas concentrations. The most important results involved delineation of tectonic framework elements some of which were not previously recognized. Thermal and thermal inertia images also permit mapping of geomorphic textural domains. A thermal lineament appears to reveal a basement discontinuity which involves the Homestake Mine in the Black Hill, a zone of Tertiary igneous activity and facies control in oil producing horizons. Applications of these data to the Cabeza Prieta, Ariz., area illustrate their potential for igneous rock type discrimination. Extension to Yellowstone National Park resulted in the detection of additional structural information but surface hydrothermal features could not be distinguished with any confidence. A thermal inertia mapping algorithm, a fast and accurate image registration technique, and an efficient topographic slope and elevation correction method were developed. Author

N82-15490*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

REMOTE SENSING IN FORESTRY: APPLICATION TO THE AMAZON REGION

Nelson deJesusParada, Principal Investigator, Antonio T. Tardin, Armando dosSantos, Pedro Hernandez Filho, and Yosio E. Shimabukuro Apr. 1981 72 p refs Sponsored by NASA ERTS

(E82-10012; NASA-CR-164755; INPE-2035-RPE/292) Avail: NTIS HC A04/MF A01 CSCL 02F

The utilization of satellite remote sensing in forestry is reviewed with emphasis on studies performed for the Brazilian Amazon Region. Timber identification, deforestation, and pasture degradation after deforestation are discussed. A.R.H.

N82-15491*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.

FISCAL YEAR 1980-81 IMPLEMENTATION PLAN IN SUPPORT OF TECHNICAL DEVELOPMENT AND INTEGRATION OF SAMPLING AND AGGREGATION PROCEDURES

Mar. 1981 88 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS

(Contract NAS9-15800; Proj. AgRISTARS)

(E82-10013; NASA-CR-161030; FC-LO-00612; LEMSCO-15168; JSC-16819) Avail: NTIS HC A05/MF A01 CSCL 02C

The specific objectives of the FY 1980-81 tasks are: (1) further refinements to the weighted aggregation procedure; (2) improved approaches for estimating within-stratum variance; (3) more intensive investigation of alternative sampling strategies such as full-frame sampling strategy, and (4) further developments in regard to a simulated approach for assessing the performance of the overall designed sampling and aggregation system.Author

N82-15492*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.

WINTERKILL INDICATOR MODEL, CROP CONDITION ASSESSMENT DIVISION (CCAD) DATA BASE INTERFACE DRIVER, USER'S MANUAL

R. F. Hansen, Principal Investigator Mar. 1981 13 p ref Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS

(Contract NAS9-15800; Proj. AgRISTARS)

(E82-10014; NASA-CR-161031; EW-L1-00713; LEMSCO-16033; JSC-17117) Avail: NTIS HC A02/MF A01 CSCL 02C

Instructions are given for using the Winterkill indicator model CCAD data base interface driver. The purpose of the system is to interface the Winterkill Indicator Model with the CCAD operational data base. The interface driver routine decides what meteorological stations should be processed and calls the proper subroutines to process the stations. Author

N82-15493*# IBM Federal Systems Div., Houston, Texas.

ERSYS-SPP ACCESS METHOD SUBSYSTEM DESIGN SPECIFICATION

R. C. Weise, Principal Investigator Sep. 1980 74 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS

(Contract NAS9-14350; Proj. AgRISTARS)

(E82-10015; NASA-CR-161039; MU-11-00300; JSC-16918) Avail: NTIS HC A04/MF A01 CSCL 02C

The STARAN special purpose processor (SPP) is a machine allowing the same operation to be performed on up to 512 different data elements simultaneously. In the ERSYS system, it is to be attached to a 4341 plug compatible machine (PCM) to do certain existing algorithms and, at a later date, to perform other to be specified algorithms. That part of the interface between the 4341 PCM and the SPP located in the 4341 PCM is known as the SPP access method (SPPAM). Access to the SPPAM will be obtained by use of the NQUEUE and DQUEUE commands. The subsystem design specification is to incorporate all applicable design considerations from the ERSYS system design specification and the Level B requirements documents relating to the SPPAM. It is intended as a basis for the preliminary design review and will expand into the subsystem detailed design specification. Author

N82-15494*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

US/CANADA WHEAT AND BARLEY CROP CALENDER EXPLORATORY EXPERIMENT IMPLEMENTATION PLAN

Sep. 1980 23 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS

(Proj. AgRISTARS)

(E82-10016; NASA-TM-84034; FC-JO-00611; JSC-16812) Avail: NTIS HC A02/MF A01 CSCL 02C

A plan is detailed for a supplemental experiment to evaluate several crop growth stage models and crop starter models. The objective of this experiment is to provide timely information to aid in understanding crop calendars and to provide data that will allow a selection between current crop calendar models. Author

N82-15495*# General Electric Co., Philadelphia, Pa. Space Div.

LANDSAT-2 AND LANDSAT-3 FLIGHT EVALUATION REPORT, 23 OCTOBER 1978 TO 23 JANUARY 1979

1 Feb. 1979 236 p ERTS

(Contract NAS5-21808)

(E82-10017; NASA-CR-166640; Doc-79SDS4201) Avail: NTIS HC A11/MF A01 CSCL 05B

Orbital parameters and adjustments are discussed and tabulated. The performance of the various subsystems and payloads on the two satellites is documented in tables. A.R.H.

N82-15496*# Mississippi State Univ., Mississippi State. Remote Sensing Center.

A PROPOSAL FOR CONTINUATION OF SUPPORT FOR THE APPLICATION OF REMOTELY SENSED DATA TO STATE AND REGIONAL PROBLEMS. PART 1: TECHNICAL PROPOSAL

Jun. 1981 114 p ERTS

(Grant NGL-25-001-054)

(E82-10018; NASA-CR-164817) Avail: NTIS HC A06/MF A01 CSCL 05A

The objectives, procedures, accomplishments, plans, and ultimate uses of information from current projects at the Mississippi Remote Sensing Center are discussed for the following applications: (1) land use planning; (2) strip mine inventory and reclamation; (3) biological management for white tailed deer; (4) forest habitats in potential lignite areas; (5) change discrimination in gravel operations; (6) discrimination of freshwater wetlands for inventory and monitoring; and (7) remote sensing data analysis support systems. The initiation of a conceptual design for a LANDSAT based, state wide information system is proposed. A.R.H.

N82-15497# Committee on Science and Technology (U. S. House).

CIVIL LAND REMOTE SENSING SYSTEMS

Washington GPO 1981 370 p Joint hearings before the Subcomm. on Space Sci. and Appl. of the Comm. on Sci. and Technol. and the Subcomm. on Sci., Technol., and Space of the Comm. on Com., Sci., and Transportation, 97th Congr., 1st Sess., No. 40, 22-23 Jul. 1981

(GPO-35-265) Avail: Subcommittee on Space Science and Applications

Steps taken to facilitate NOAA assumption of responsibility for operating LANDSAT D and LANDSAT D prime are reviewed and institutional alternatives for transferring operational responsibility for the program to the private sector are examined. These include: (1) an existing private corporation; (2) a legislatively established for profit private corporation; (3) a government corporation; and (4) Federal agency ownership with private sector operation. The advantages and disadvantages of each of these options are considered as well as user participation. A.R.H.

N82-15498*# EG and G Washington Analytical Services Center, Inc., Pocomoke City, Md.

A GLOBAL ATLAS OF GEOS-3 SIGNIFICANT WAVEHEIGHT DATA AND COMPARISON OF THE DATA WITH NATIONAL BUOY DATA

J. D. McMillan Wallops Island, Va. NASA. Wallops Flight Center Nov. 1981 163 p refs

(Contract NAS6-2639)
(NASA-CR-156882) Avail: NTIS HC A08/MF A01 CSCL 08C

The accuracy of the GEOS-3 significant waveheight estimates compared with buoy measurements of significant waveheight were determined. A global atlas of the GEOS-3 significant waveheight estimates gathered is presented. The GEOS-3 significant waveheight estimation algorithm is derived by analyzing the return waveform characteristics of the altimeter. Convergence considerations are examined, the rationale for a smoothing technique is presented and the convergence characteristics of the smoothed estimate are discussed. The GEOS-3 data are selected for comparison with buoy measurements. The GEOS-3 significant waveheight estimates are assembled in the form of a global atlas of contour maps. Both high and low sea state contour maps are presented, and the data are displayed both by seasons and for the entire duration of the GEOS-3 mission. E.A.K.

N82-15499# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
ANALYSIS OF SATELLITE OBSERVATIONS: THEORETICAL STUDIES ON THE SAMPLING PROBLEM [ANALYSE VON SATELLITENBEOBACHTUNGEN - THEORETISCHE UNTERSUCHUNGEN ZUM SAMPLING PROBLEM]
Hans Joachim Preuss 1981 68 p refs In GERMAN; ENGLISH summary
(Mitt-31; ISSN-0069-5882) Avail: NTIS HC A04/MF A01

In a general mission analysis, some orbital and measuring characteristics are simulated and their influence on the sampling investigated. The important role of a satellite with a moderate inclination (approximately 60 deg) is shown; with the drifting orbit homogeneous sampling of diurnal variations and of radiance distributions is possible in a global scale within about 15 days. More complex scan modes (off track, rotary or conical) may improve the angular sampling, especially in case of Sun synchronous satellites, but for studies in small temporal and spatial scales a system with at least three satellites is necessary. The general results are applied on the determination of the radiation balance. By means of models for the diurnal variations and anisotropic behavior, measurements are created and sampling errors demonstrated. Author

N82-15500# Marconi Co. Ltd., Chelmsford (England). Communications Research Div.
ADDITIONAL STUDIES OF EARTH RESOURCES SYNTHETIC APERTURE RADAR PAYLOADS Final Report
A. P. Luscombe Paris ESA Oct. 1980 105 p refs
(Contract ESA-6225/80-F-CG(SC))
(MTR-80/90; ESA-CR(P)-1469) Avail: NTIS HC A06/MF A01

Results of design studies on the synthetic aperture radar payload are discussed. A new baseline system for an incidence angle of about 45 deg was specified, and its performance at smaller angles is assessed. A feasibility study of a squinted SAR system is described. For individual titles, see N82-15501 through N82-15502.

N82-15501# Marconi Co. Ltd., Chelmsford (England). Communications Research Div.
NEW BASELINE SYSTEM Final Report
In its Additional Studies of Earth Resources Syn. Aperture Radar Payload Oct. 1980 46 p refs (For primary document see N82-15500 06-43)
Avail: NTIS HC A06/MF A01

A baseline system with an incidence angle of around 45 deg was specified for the Earth resources SAR payload and its operation at smaller angles was investigated. The basic system design and method of analysis are described. The choices of pulse repetition frequency (PRF) for different incidence angles, the problem of ambiguities and their evaluation and the antenna beam patterns are covered along with the selection of major system parameters (beam pattern, PRF's and incidence angles). The detail and the baseline system suggested is analyzed in terms of the image quality specifications. Two more aspects of the SAR system, the transmitter power requirements and the variation in ground range resolution with incidence angle, are discussed. A listing of the basic results for four different incidence angles is given. J.M.S.

N82-15502# Marconi Co. Ltd., Chelmsford (England). Communications Research Div.
SQUINTED SAR SYSTEM Final Report
In its Additional Studies of Earth Resources Syn. Aperture Radar Payload Oct. 1980 32 p refs (For primary document see N82-15500 06-43)
Avail: NTIS HC A06/MF A01

It is found that for conventional SAR systems pointing broadside to the satellite track it is impossible to obtain the required swarth width at several incidence angles with the same antenna design. It is suggested that the swath width might be increased by 'squinting' the beam forwards or backwards. A feasibility study of such a system is discussed. J.M.S.

N82-15503# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Hochfrequenztechnik.
VISUAL EVALUATION OF E-SLAR IMAGERY
Juergen Nithack Feb. 1981 52 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-734)
(DFVLR-FB-81-11) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 13.10

Flights were conducted E-SLAR (side looking airborne radar) for remote sensing experiments with active microwave techniques (X-band). The analog recorded data were mainly evaluated by visual methods to judge the system and its usefulness to solve Earth scientific questions. J.M.S.

N82-15504# Naval Postgraduate School, Monterey, Calif. Dept. of Oceanography.
BIOLOGICAL PATCHINESS IN RELATION TO SATELLITE THERMAL IMAGERY AND ASSOCIATED CHEMICAL MESOSCALE FEATURES M.S. Thesis
Ronald Wayne Phoebus Jun. 1981 63 p refs
(AD-A105757) Avail: NTIS HC A04/MF A01 CSCL 08/1

The presence of biological patches, or communities, can have a direct effect on Naval operations, scientific research, and fisheries. It is shown that remote infrared satellite sensing may be used as a real-time tool to accurately locate thermally and biologically significant features. Several physical, chemical, and biological variables were sampled in the surface layer of mesoscale thermal features which were located using satellite imagery. The bio-chemical sampling produced replicate results from which the distribution of biomass could be inferred. Possible explanations are advanced for patch forming mechanisms and biomass distribution. Author (GRA)

N82-15505# Texas Univ., Austin. Bureau of Economic Geology.
STRUCTURAL EVOLUTION OF THREE GEOPRESSURED-GEOTHERMAL AREAS IN THE TEXAS GULF COAST
Charles D. Winker, Robert A. Morton, and Deborah D. Garcia 1981 13 p refs Presented at the 5th Geopressured-Geothermal Energy Conf., Baton Rouge, La., 13 Oct. 1981
(Contract DE-AC08-79ET-27111)
(DE81-029799; CONF-811026-9) Avail: NTIS HC A02/MF A01

Detailed analysis of geological and seismic data from several geopressured geothermal areas (Cuero, Blessing, Pleasant Bayou) reveals similarities in structural-stratigraphic relationships that form geopressured aquifers as well as differences in structural complexity and evolution that characterize the different areas. In these examples, geopressured sandstones are isolated on the updip side by downfaulting against shelf-slope shales, and on the downdip side by unfaulting against transgressive marine shales. Moreover, they are isolated above and below by thick sequences of transgressive shale or interbedded sandstone and shale. Prospective reservoirs are found where delatic and associated sandstones (distributary channel, delta front, barrie-strandplain) were deposited seaward of major growth faults and near the shelf margin. DOE

N82-15506# Geological Survey, Denver, Colo.
PRELIMINARY ANALYSIS OF GRAVITY AND AEROMAGNETIC SURVEYS OF THE TIMBER MOUNTAIN AREA, SOUTHERN NEVADA
M. F. Kane, M. W. Webring, and B. K. Bhattacharyya 1981

143 p refs
(Contract DE-AI08-78ET-44802)
(DE81-029462; DOE/ET-44802/T2; USGS-Open-File-81-189) Avail: NTIS HC A07/MF A01

Gravity and aeromagnetic surveys revealed details of subsurface structure and lithology. Information caused by volcanic events accommodated along straight line faults combining to give a curvilinear appearance to regional structure is suggested. The magnetic data suggest that rock units may have been altered, perhaps thermally, from their original state. The gravity data indicate that the south part of Timber Mountain is underlain by relatively dense and possibly intrusive rock, like that which crops out along its southeast side. The gravity data also suggest that the Silent Canyon caldera may extend considerably south of its presently indicated southern limit and may underlie much of the area of Timber Mountain. The moat areas appear to be more rectangular or triangular than annular in shape. The southern part of Timber Mountain caldera is separated from the Yucca Mountain area to the south by a triangular horst. The structural relations of the rock units making up the horst are complex. Several linear terrain features in the southern part of the caldera area are closely alined with geophysical features, implying that the terrain features are fault controlled. DOE

N82-15507# Academy of Natural Sciences, Avondale, Pa. Water Research Center.
GEOGRAPHIC ANALYSIS OF THERMAL EQUILIBRIA: A BIOENERGETIC MODEL FOR PREDICTING THERMAL RESPONSE OF AQUATIC INSECT COMMUNITIES Technical Progress Report, 1 Jul. 1980 - 31 Dec. 1981
R. L. Vannote and B. W. Sweeney 28 Aug. 1981 65 p refs
(Contract DE-AC02-79EV-10259)
(DE81-029680; DOE/EV-10259/2) Avail: NTIS HC A04/MF A01

A conceptual model describing the effects of natural and altered temperature regimes on laval growth and adult size and fecundity of hemimetaboloyus aquatic insects is tested and modified. The central hypothesis is that the stability of a given population (i.e., the ability to recover from serious reduction in numbers by environmental perturbations or fluctuations) within the geographic range of a species reflects mainly a dynamic equilibrium between temperature and individual growth, metabolism, reproductive potential, and generation time. In this context, a thermal regime is viewed as optimum for a species when individual body weight and fecundity is maximized. The model predicts that geographic range extension away from a location with an optimum thermal regime would be associated with temperature induced changes in the rate and efficiency of energy use, developmental processes, and generation time. DOE

N82-15508# Gulf Universities Research Consortium, Bellaire, Tex.
RELATIONAL METHODOLOGY FOR INTEGRATING AND ANALYZING FIELD TEST AND RESEARCH DATA DESCRIBING ENHANCED OIL RECOVERY
Bill A. Bavinger, Scott Callaway, Donna Tice Goodbread, and James L. Gumnick Oct. 1981 154 p refs
(Contract DE-AC01-76ET-10145)
(DE81-030441; DOE/ET-10145/72) Avail: NTIS HC A08/MF A01

The application of concepts of relational analysis for the integration of two experimental data bases was demonstrated. The following data bases are created: the enhanced oil recovery field test data base; and the enhanced oil recovery research data base. DOE

N82-15509# University of Southern Mississippi, Hattiesburg. Dept. of Polymer Science.
IMPROVED POLYMERS FOR ENHANCED OIL RECOVERY SYNTHESIS AND RHEOLOGY Annual Report, Oct. 1979 - Sep. 1980
C. L. McCormick, R. D. Hester, H. H. Neidinger, and G. C. Wildman Apr. 1981 300 p refs
(Contracts DE-AS05-77ET-12038; EF-77-S-05-5603)
(DE81-030194; DOE/ET-12038/T3; AR-3) Avail: NTIS HC A13/MF A01

The synthesis, characterization, and rheological studies of random and graft copolymers which are used as models for mobility control agents in enhanced oil recovery are reported. The following procedures are studied: macromolecular syntheses of model polymers, dilute solution viscosity, aqueous size exclusion chromatography, and laser light scattering. DOE

N82-15510# Battelle Pacific Northwest Labs., Richland, Wash.
RESERVOIR STABILITY STUDIES
T. J. Doherty Jul. 1981 9 p refs Presented at Mech. Magnetic and Energy 1981 Ann. Contractors Review Meeting, Washington, D.C., 24 Aug. 1981
(Contract DE-AC06-76RL-01830)
(DE81-030099; PNL-SA-9782; CONF-810833-9) Avail: NTIS HC A02/MF A01

Stability criteria for large underground reservoirs in salt domes, hard rock caverns, and porous rock structures for air storage in utility applications were studied. Reservoir stability commercialization of compressed air energy storage (CAES) systems was emphasized. A state-of-the-art assessment, numerical model development and experimental studies culminating in field research, was formulated. Site specific geotechnical design evaluations using methodologies to assess hard rock carvern stabilty, implementation of in-mine research on the response of domal salt, integrated laboratory and field study facilities to assess developed predictive methods and determine in situ response of a porous media reservoir to air injection are completed. DOE

N82-15511# Purdue Univ., Lafayette, Ind. Water Resources Research Center.
OPTIMAL MIX OF ADJUSTMENTS TO FLOODS
T. L. Morin, W. L. Meier, Jr., and K. S. Nagaraj Jun. 1981 106 p refs Sponsored by Office of Water Research and Technology
(PB81-240533; TR-139) Avail: NTIS HC A06/MF A01 CSCL 13B

Developing a general methodology for the solution of the optimal mix of adjustment problems is addressed. It is recognized that the overall problem has an underlying sequencing nature which can be exploited in order to use a dynamic programming solution approach which bears distinct similarities to the sequencing approaches used in electric generation planning problems. Algorithmic details and computational refinements are also discussed. Data requirements and implementation details are also discussed and details of an application to a real world problem are given. GRA

N82-15512# Florida Univ., Gainesville. Dept. of Coastal and Oceanographic Engineering.
PORT CANAVERAL ENTRANCE GLOSSARY OF INLETS REPORT NO. 9
S. D. Hunt and H. Kojima Dec. 1980 56 p refs Sponsored by NOAA
(PB81-238149; FSG-R-39; NOAA-81062914) Avail: NTIS HC A04/MF A01 CSCL 08F

Information available on Port Canaveral is summarized in order to aid in the evaluation of the effect of the Port on the economics, recreation, water quality, and shoreline stability of the surrounding area. Specifically, the geologic setting is described and the climate and storm history of the Port is examined. Morphological changes, hydraulics, and sedimentary processes are also peculiar to the Port addressed. J.M.S.

N82-15513# Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
FORT GEORGE INLET GLOSSARY OF INLETS, REPORT NO. 10
H. Kojima and S. D. Hunt Nov. 1980 56 p refs Sponsored by NOAA
(PB81-238925; FSG-R-38; NOAA-81062801) Avail: NTIS HC A04/MF A01 CSCL 08F

Information available on Fort George Inlet is summarized in order to aid in the evaluation of the effect of the inlet on the economics, recreation, water quality, and shoreline stability of the surrounding area. Specifically, the geologic setting is described and the climate and storm history of the inlet is examined. Morphological changes, hydraulics, and sedimentary processes peculiar to the inlet are also addressed. J.M.S.

N82-15514# Teknekron, Inc., McLean, Va.
COAL RESOURCES AND SULPHUR EMISSION REGULATIONS: A SUMMARY OF 8 EASTERN AND MIDWESTERN STATES Final Report, Apr. 1979 - Mar. 1981
Richard A. Chapman and Marcella A. Wells May 1981 112 p refs Prepared for Versar, Inc., Springfield, Va.
(Contract EPA-68-02-3136)
(PB81-240319; EPA-600/7-81-086) Avail: NTIS HC A06/MF A01 CSCL 13B

Coal resources, current coal use, and the effectiveness of SO2 control strategies for use by coal users, regulators, and administrators in future coal related decisions were analyzed. The eight major eastern and midwestern coal producing states are discussed and each state's analysis includes a general overview of the coal industry, an overview of coal properties, a description of major coal seams, an analysis of the quantity of coal available to meet various SO2 emission regulations, and information regarding the sulfur content of coals used by utilities in 1979. Physical coal cleaning and the use of low sulfur coal as viable emission control strategies are emphasized. The coal assessment processor model was developed to determine the quantity of coal that would be available in each state to meet various SO2 emission regulations using one or a combination of alternative SO2 control technologies. GRA

N82-15515# Geological Survey, Hartford, Conn. Water Resources Div.
WATER RESOURCES DATA FOR CONNECTICUT, WATER YEAR 1980 Annual Water-data Report, 1 Oct. 1979 - 30 Sep. 1980
Apr. 1981 414 p refs
(PB81-245292; USGS/WRD/HD-81/035; USGS-WRD-CT-80-1) Avail: NTIS HC A18/MF A01 CSCL 08H

Water Resources Data for the 1980 water year for Connecticut were recorded. Data consist of records of stage, discharge, and water quality of streams, stage, contents and water quality of lakes and reservoirs; and water levels and water quality of ground-water wells. Records for water discharge at gaging stations; storm discharge at gaging stations; tidal volume at a gaging station; contents at lakes and reservoirs; water quality at gaging stations, lakes and reservoirs, harbors, wells, and springs; and water levels at observation wells. Crest-stage partial-record stations are also included. GRA

N82-15516# Geological Survey, Madison, Wis. Water Resources Div.
WATER RESOURCES DATA FOR WISCONSIN, WATER YEAR 1980 Annual Water-data Report, 1 Oct. 1979 - 30 Sep. 1980
May 1981 519 p refs
(PB81-235186; USGS/WRD/HD-81/045; USGS-WRD-WI-80-1) Avail: NTIS HC A22/MF A01 CSCL 08H

Water resources data for the 1980 water year for Wisconsin are reported. The data includes: records of streamflow at gaging stations, partial record stations, and miscellaneous sites; records of reservoir storage, records of chemical, physical, and biological characteristics of surface water, ground water, and precipitation, and records of water level in observation wells. GRA

N82-15517# Geological Survey, Boise, Idaho.
WATER RESOURCES DATA FOR IDAHO, WATER YEAR 1980. VOLUME 1: GREAT BASIN AND SNAKE RIVER BASIN ABOVE KING HILL Annual Report, 1 Oct. 1979 - 30 Sep. 1980
Jun. 1981 384 p
(PB81-244188; USGS/WRD/HD-80/052; USGS-WRD-ID-80-1) Avail: NTIS HC A17/MF A01 CSCL 08H

Water resources data for the 1980 water year for Idaho are given including records of stage, discharge, and water quality of streams, stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. GRA

N82-15518# Geological Survey, Boise, Idaho. Water Resources Div.
WATER RESOURCES DATA FOR IDAHO, WATER YEAR 1980. VOLUME 2: UPPER COLUMBIA RIVER BASIN AND SNAKE RIVER BASIN BELOW KING HILL Annual Water-data Report, 1 Oct. 1979 - 30 Sep. 1980
Jun. 1981 393 p refs
(PB81-244196; USGS/WRD/HD-80/053; USGS-WRD-ID-80-2) Avail: NTIS HC A17/MF A01 CSCL 08H

Water resources data for the 1980 water year for Idaho consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water quality of ground water. Discharge records for 192 gaging stations are reported. GRA

N82-15519# Guam Univ., Agana. Water Resources Research Center.
ESTIMATE OF RECHARGE TO THE FRESHWATER LENS OF NORTHERN GUAM
Jerry F. Ayers Mar. 1981 28 p refs
(Contract DI-14-34-0001-0112)
(PB81-233595; W81-04366; OWRT-A-017-GUAM(1)) Avail: NTIS HC A03/MF A01 CSCL 08H

The groundwater hydrology of Guam was studied over several decades. The chloride-ion concentration in the rainwater was examined. The chloride ion is used as a tracer which is concentrated evapotranspiration. GRA

N82-15520# National Ocean Survey, Rockville, Md.
A HISTORY OF FLYING AND PHOTOGRAPHY: IN THE PHOTOGRAMMETRY DIVISION OF THE NATIONAL OCEAN SURVEY 1919 - 1979
John T. Smith, Jr. 1980 493 p refs
(PB81-246738; NOAA-81071405) Avail: NTIS HC A21/MF A01 CSCL 14E

A history of aerial photography and its impact on photogrammetric geodesy is presented. The work of pilots, navigators, and photographers as teams is narrated. Early mapping activities are reported. Development of the nine lens camera is described. Other topics include pilot training, testing of color and infrared photography, the B-17 photographic aircraft, beginning the Liberian survey, adaptation to new equipment, Saudi Arabia mapping, the Buffalo aircraft, and the RC-10 camera. GRA

N82-15521# Colorado Cooperative Fishery Unit, Fort Collins.
STUDIES OF THE EFFECTS OF OPERATING THE MT. ELBERT PUMPED-STORAGE POWERPLANT ON TWIN LAKES, COLORADO: 1979 REPORT OF FINDINGS
James F. LaBounty, James J. Sartoris, Sharon G. Campbell, John R. Boehmke, and Richard A. Roline Dec. 1980 73 p refs
(PB81-240483; REC-ERC-80-7) Avail: NTIS HC A04/MF A01 CSCL 08H

The studies were performed to qualify and quantify the changes that occur to the limnological features of Twin Lakes because of the powerplant. Twin Lakes are a pair of dimictic, connected, montane, drainage lakes of glacial origin. T.M.

N82-15522# West Virginia Univ., Morgantown. Engineering Experiment Station.
DEVELOPMENT OF TESTS AND CRITERIA TO EVALUATE GROUNDING SYSTEMS Open File Report, 1 Jul. 1979 - 31 Oct. 1980
Wils L. Cooley and Robert L. McConnell Nov. 1980 177 p refs
(Contract DI-BM-J0-199116)
(PB81-238354; BM-OFR-103-81) Avail: NTIS HC A09/MF A01 CSCL 08I

Aspects of mine safety ground systems, primarily for underground coal mines are reported. The design of a combined ground fault ground check monitoring system is presented. Grounding systems for dc shuttle cars are analyzed. Resistance data and results of physical inspections of self salting ground rods are presented. A resistance and economic analysis for the use of composite materials for building inexpensive and effective ground beds in high resistivity areas is examined. The desirability of penetrating the coal seam with a borehole safety ground is investigated. GRA

N82-15523# Geological Survey, Helena, Mont. Water Resources Div.

STEAMFLOW CHARACTERISTICS OF THE HUDSON BAY AND UPPER MISSOURI RIVER BASINS, MONTANA, THROUGH 1979 Final Report

Ronald R. Shields and Melvin K. White Aug. 1981 150 p ref Prepared in cooperation with the Montana Dept. of Natural Resources and Conservation

(PB81-247199; USGS/WRD/WRI/81-075; USGS/WR1-81-32) Avail: NTIS HC A07/MF A01 CSCL 08H

Statistical summaries of streamflow data for selected stream gaging sites to aid in appraising the hydrology of the Hudson Bay and upper Missouri River basins are measured. Streamflow record collection in the Hudson Bay and upper Missouri River basins began in 1890. A brief description is given for station location, drainage area, period of record, revisions of previously published records, type and history of gages, regulation and diversions, and extremes of discharge. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N82-15524*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SATELLITE POWER SYSTEM: CONCEPT DEVELOPMENT AND EVALUATION PROGRAM. VOLUME 7: SPACE TRANSPORTATION

Nov. 1981 258 p refs Prepared in cooperation with NASA. Johnson Space Center, Houston, Tex.

(NASA-TM-58238) Avail: NTIS HC A12/MF A01 CSCL 10A

During the several phases of the satellite power system (SPS) concept definition study, various transportation system elements were synthesized and evaluated on the basis of their potential to satisfy overall SPS transportation requirements and their sensitivities, interfaces, and impact on the SPS. Additional analyses and investigations were conducted to further define transportation system concepts that will be needed for the developmental and operational phases of an SPS program. To accomplish these objectives, transportation systems such as the shuttle and its derivatives were identified; new heavy-lift launch vehicle (HLLV) concepts, cargo and personnel orbital transfer vehicles (COTV and POTV), and intra-orbit transfer vehicle (IOTV) concepts were evaluated; and, to a limited degree, the program implications of their operations and costs were assessed. The results of these analyses were integrated into other elements of the overall SPS concept definition studies. Author

N82-15525*# Naval Weapons Support Center, Crane, Ind. Weapons Quality Engineering Center.

EVALUATION PROGRAM FOR SECONDARY SPACECRAFT CELLS: SEVENTEENTH ANNUAL REPORT OF CYCLE LIFE TEST Annual Report

J. D. Harkness 1 Feb. 1981 308 p refs

(NASA Order C-13105D)

(NASA-CR-165071; WQEC/C-81-1; AR-17) Avail: NTIS HC A14/MF A01 CSCL 10C

Acceptance tests were conducted on nickel cadmium, silver cadmium, and silver zinc cells to insure that all cells put into the life cycle program meet the specifications outlined in the respective purchase contracts. Statistical information is presented on cell performance characteristics and limitations. Weaknesses discovered in cell design are reported and aid in research and development efforts toward improving the reliability of space batteries. Battery weaknesses encountered in satellite programs such as IMP, NIMBUS, OGO, OAO, SAS, and TETR were studied and remedied through special tests. A.R.H.

N82-15526*# Vanderbilt Univ., Nashville, Tenn. Dept. of Physics and Astronomy.

ADVANCED SOLAR ENERGY CONVERSION Annual Progress Report, 1 Sep. 1980 - 31 Aug. 1981

Ja H. Lee 31 Aug. 1981 22 p refs

(Contract NCC1-8)

(NASA-CR-165060) Avail: NTIS HC A02/MF A01 CSCL 10A

An atomic iodine laser, a candidate for the direct solar pumped lasers, was successfully excited with a 4 kW beam from a xenon arc solar simulator, thus proving the feasibility of the concept. The experimental set up and the laser output as functions of operating conditions are presented. The preliminary results of the iodine laser amplifier pumped with the HCP array to which a Q switch for giant pulse production was coupled are included. Two invention disclosures - a laser driven magnetohydrodynamic generator for conversion of laser energy to electricity and solar pumped gas lasers - are also included. S.L.

N82-15527*# Burns and Roe, Inc., Woodbury, N. Y.

MHD OXIDANT INTERMEDIATE TEMPERATURE CERAMIC HEATER STUDY Final Report

A. W. Carlson, I. L. Chait, D. P. Saari, and C. L. Marksberry Sep. 1981 199 p refs Prepared in cooperation with Fluidyne Engineering Corp.

(Contract DEN3-107; DE-AI01-77ET-10769)

(NASA-CR-165453; DOE/NASA-0107/3) Avail: NTIS HC A09/MF A01 CSCL 10A

The use of three types of directly fired ceramic heaters for preheating oxygen enriched air to an intermediate temperature of 1144K was investigated. The three types of ceramic heaters are: (1) a fixed bed, periodic flow ceramic brick regenerative heater; (2) a ceramic pebble regenerative heater. The heater design, performance and operating characteristics under conditions in which the particulate matter is not solidified are evaluated. A comparison and overall evaluation of the three types of ceramic heaters and temperature range determination at which the particulate matter in the MHD exhaust gas is estimated to be a dry powder are presented. E.A.K.

N82-15528# Leybold-Heraeus G.m.b.H., Hanau/Main (West Germany). Werksgruppe M.

PROCESS DEVELOPMENT FOR LARGE-SCALE PRODUCTION OF CdS THIN FILM SOLAR CELLS SPUTTERED COPPER SULFIDE LAYERS AND CADMIUM SULFIDE-COPPER SULFIDE HETEROJUNCTIONS. APPLICATION OF HIGH RATE SPUTTERING USING HOT-PRESSED TARGETS Final Report

Werner Mueller, Wolf-Dieter Muenz, Karl Radler, and Karl-Heinz Schuller Bonn Bundesministerium fuer Forschung und Technologie Apr. 1981 158 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-069; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32.30

A method was developed for the manufacturing of stoichiometrically composed copper sulphide-layers and of polycrystalline CdS-layers using a diode sputtering process. Heterojunctions were produced with a Cds-layer-thickness of 6 micrometers and on solarelectric efficiency of 1%. High rate sputtering cathodes were developed and their suitfulness, when sputtering CdS, was tested. Using high rate sputtering the sputtering rate of targets with 200 mm diameter could be increased by the factor 5 to 9 nm/sec. T.M.

N82-15529# Varta Batterie A.G., Kelkheim (West Germany). Forschungs- und Entwicklungszentrum.

ENERGY STORAGE SYSTEMS FOR TERRESTRIAL SOLAR GENERATORS Final Report, Dec. 1980

Margarete Jung Bonn Bundesministerium fuer Forschung und Technologie May 1981 76 p refs In GERMANY; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-082; ISSN-0340-7608) Avail: NTIS

HC A05/MF A01; Fachinformationszentrum, Karlruhe, West Germany DM 16

Mercury can react with Raney nickel to form the alloy NiHg4. This intermetallic compound is the basis of an excellently rechargeable positive electrode material. In combination with cadmium it forms a rechargeable cadmium/mercury oxide cell which can be operated under hermetically sealed conditions. Since both electrodes are thermodynamically stable in aqueous alkaline electrolytes, the self discharge rate of the cell is very low and hence the Coulomb efficiency even at very low charge rates in the order of 1000 - 2000 hrs. is higher than 95%. The cadmium/mercury oxide cells can be cycled more than a hundred times. These cells are particularly qualified to serve as an energy storage in combination with photovoltaic cells. Author

N82-15530# Internationale Atomreaktorbau Gesellschaft, Bensberg (West Germany). Abt. Anlagenbau.

GAS COOLED SOLAR POWER PLANT FOR GENERATING ELECTRICAL ENERGY IN THE 20MWe OPERATING RANGE (GAST): PRELIMINARY DESIGN PHASE Final Report, Nov. 1980

Siegfried Kostrzewa and Peter Wehowsky Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 33 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-097; ISSN-0340-7608; IAT-BS-100000-010) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 7

R&D work required for the erection of a pilot plant was defined. Since the location of the site is not yet determined, the project work was based on preliminary basic data. Significant results of the preliminary design phase include both the choice of a combined gas/steam thermal energy conversion process for the reference concept and basic concepts for heliostat, heliostat field arrangement, receiver, tower and master control/process computer system. A.R.H.

N82-15531# Varta Batterie A.G., Kelkheim (West Germany). Forschungs- und Entwicklungszentrum.

NICKEL-IRON BATTERY OF HIGH ENERGY DENSITY Final Report, Jul. 1980

Guenter Kraemer, V. Antony Oliapuram, Karl-Wilhelm Lexow, and Karl-Georg Horn Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 163 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-100; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 32,80

The energy and power densities of conventional Nickel-Iron accumulators at about 26 wh/kg (5 h) and 18 w/kg (1 h) respectively are rather low. By using active materials of high utilization, electrode construction with low-weight support, light cell containers, and less electrolyte with gas recombination specific values of 45 wh/kg (5 h) and 35 w/kg (1 h) can be obtained as well as short-time load peaks of about 100 w/kg. An elastic casing is an essential feature of the new battery. The reversible pressure-volume changes can be used as a state-of-charge indicator. Production procedures, experimental results and recommendations for use are given. A 1 kwh batter has been completed. Author

N82-15532# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). New Energy Technology.

DEVELOPMENT OF A PROTOTYPE OF A 10 kW SMALL SOLAR POWER PLANT Final Report, Sep. 1979

Franz Maier and Josef Haenfling Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 170 p ref In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-101; ISSN-0340-7608) Avail: NTIS HC A08/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 33,50

Activities performed in the design and construction of a solar driven 10 kW turbogenerator for local TV-educational systems, irrigation pumps and other applications in developing countries include: (1) System design and thermodynamic calculation; (2) Design of the collector array and construction; (3) Fixing of components and auxiliary units; (4) Turbine design, construction, manufacture and test run; (5) Generator design, construction, manufacture and test run; (6) Turbogenerator integration and test; (7) Electrical supply, plant control and regulation; and (8) Test assembly, performance and analysis. Component tests are being run and are being evaluated by a data acquisition unit installed on site. A.R.H.

N82-15533# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Hauptabt. Neue Technologie Energietechnik.

DEVELOPMENT OF A SIMPLE WATER PUMP DRIVEN WITH SOLAR ENERGY Final Report

Dieter Schneller and Klaus Speidel Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 48 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-119; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10,10

A piston engine, a solar collector with direct evaporation, and a processing plant were developed and constructed. The water pump worked satisfactorily under three months of European weather conditions. A total efficiency of 2.5% was reached (efficiency being defined as hydraulic output/solar energy input on installed collector field). The pump is intended to meet the water requirements of small village communities. T.M.

N82-15534# Prins Maurits Lab. TNO, Rijswijk (Netherlands). Inst. voor Chemische en Technologische Research.

SOLAR POWER SYSTEMS SMALLER THAN 500 W FOR MILITARY USE

P. P. M. M. Wittgen Nov. 1979 27 p refs In DUTCH; ENGLISH summary

(Contract A78/KL/125)

(PML-1980-06; TDCK-73397) Avail: NTIS HC A03/MF A01

A literature search of the feasibility of using photovoltaic cells for the energy supply of low power-consuming military equipment is presented. Progress in the technology of solar cells in the coming years offers good prospects for the use of photovoltaic systems. A hybrid system consisting of an array of solar cells combined with secondary batteries in a sunny climate is capable of supplying equipment with energy. Climatic conditions in the Netherlands and the northern part of Germany are too bad for a fully self-supporting year round system. Especially in winter the intensity and quantity of the radiation is too low. In these northern regions the hybrid solar system can only be used when additional primary or secondary batteries are accepted in the winter period. J.D.H.

N82-15535# Battelle Inst., Frankfurt am Main (West Germany).

DEVELOPMENT OF A CADMIUM SELENIDE THIN FILM SOLAR CELL Final Report, Mar. 1980

Edmund Rickus Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 85 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-109; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17,85

Examinations of the physical and chemical structure of thin CdSe films and their surfaces show that not only the electronic structure, but also the orientation and morphology of the semiconductor layer have a strong influence on the photovoltaic properties of the cells. The MIS structures with a chromium back contact, a 2 nm thick undoped CdSe layer, a 4 to 5 nm thick ZnSe layer, and a 20 nm thick gold layer show efficiencies of more than 6% related to a radiation f 100 mW/sq cm reaching the CdSe layer. At the present stage of development, efficiencies of more than 4% can be realized with very simple, not yet optimized ZnS antireflection coatings. As the analysis of current-voltage characteristics shows, the open circuit voltage and the presently relatively low fill factor can be enhanced by improved doping. This gives a realistic goal of about 10% efficiency for further work. Author

N82-15536# Institut fuer Kemtechnik und Energiewandlung e.V., Stuttgart (West Germany). Abteilung Energiewandlung und Waermetechnik.

INVESTIGATION OF MEDIUM AND HIGH TEMPERATURE PHASE CHANGE MATERIALS FOR THERMAL ENERGY STORAGE Final Report, Apr. 1980

Dietmar Heine, Friedrich Heess, and Dieter Steiner Bonn: Bundesministerium fuer Forschung und Technologie Aug. 1981 110 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-149; ISSN-0340-7608) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 23,10

Investigations in the temperature ranges 200 to 450 C and 700 to 900 C, are reported. These investigations comprise the corrosion of structural materials together with promising storage materials and the thermal stability and the melting and freezing behavior of the storage materials. The mass losses of sheet metal samples were measured from the corrosion tests, and thickness reduction and corrosion rate were calculated. The corrosion type was determined using microscopes. Furthermore, melting and freezing curves were continually measured during cycling tests. The thermal stability of the storage materials was thereby determined as a function of the melting and freezing properties. The combinations mild steel with NaNO3, boiler steel with KCl-ZnCl2, NaNO3 and MgCl2-NaCl, and NICu30Fe with KCl-ZnCl2 were found to be compatible in the temperature range 200 to 450 C. T.M.

N82-15537# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Raumfahrt.

ORGANIC FLUIDS FOR THE PRACTICAL USE IN ENERGY CONVERSION SYSTEMS OF SOLAR POWER PLANTS Final Report, Jun. 1980

Guenther Schmidt, Dietmar Wolf, and Eberhard Raasch Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 76 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-154; ISSN-0340-7608) Avail: NTIS HC A05/MF A01

With respect to their specific performance, the most promising organic fluids were determined for their practical use in Rankine cycles operating in the temperature range between 150 and 400 C. For these fluids, the process cycle efficiencies were compared for different temperature levels. Laboratory experiments with a great number of fluids and lubricants results in the estimation of the operation limit in Rankine Cycles. A test facility consisting of a heating system, an organic Rankine cycle and a control and measurement system was designed, built, and put into operation for testing various working fluids. Author

N82-15538# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).

HIGH EFFICIENT COLLECTOR FOR SMALL SOLAR-POWERED FACILITIES Final Report

Eugen Obermayr, Wolfgang Molt, Dieter Schneller, and Klaus Speidel Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 100 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-156; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21

A series of preliminary investigations and laboratory tests were performed as a basis for developing a new type of solar collector. The vacuum flat plate collectors are actually evaporators, where the working medium is evaporated within the collector itself. Prototypes of direct evaporation collectors were constructed and tested. In the temperature range seen for this application (130 - 150 C), the collector efficiency is about 40 - 50 percent. L.F.M.

N82-15539# Heraeus (W. C.) G.m.b.H., Hanau (West Germany). Produktbereich Vakumtechnik.

DEVELOPMENT OF A PROCESS FOR AN INEXPENSIVE PRODUCTION OF THIN FILM SOLAR CELLS ON AN INDUSTRIAL SCALE Final Report, Jul. 1980

Norbert Ruecker Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 32 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-159; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 6,70

A process was developed for an inexpensive production of CdS/Cu(x)S solar cells on an industrial scale. Using a pre-covering evaporated thickness of 3 micron Cd-films exhibit a grain size of more than 3 micron. Cadmium can be converted to alpha-CdS by a thermal treatment in a H2S-containing atmosphere. It is expected that the time of conversion can be reduced by optimizing the process. The CdS grain size is some tenths of a micron on the surface; below the surface it increases. The resistivity of converted CdS-layers can be enhanced in a definite manner by exposure to a glow discharge containing H2S. Using this technique the connection of the CdS-layer to the substrate by means of Cd-metal is guaranteed. Further investigations should be extended to thicker layers. The Cu(x)S-film should be formed by thermal evaporation. J.M.S.

N82-15540# Kraftanlagen A.G., Heidelberg (West Germany).

THE MIT ABU EL KOM SOLAR DEMONSTRATION PROJECT IN EGYPT. PHASE A: SOLAR THERMAL INSTALLATIONS Final Report, Mar. 1980

Friedrich Reinmuth Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 71 p refs In GERMAN; ENGLSH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-164; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 14,90

Maintenance-free solar installations were tested under unfavorable operating conditions in a village in Egypt. Thirty-five simple domestic hot water installations, designed as natural circulation systems of a collector surface of 2 sqm each and a 120 liter boiler mounted on the roof were examined. These installations were completely mounted and commissioned. The performance and efficiency of the systems were satisfactory. T.M.

N82-15541# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Space Div.

COMPARISON OF CONCEPTS FOR SOLAR-HEATED OR SOLAR-DRIVEN ABSORPTION AND COMPRESSION COOLING MACHINES FOR AIR CONDITIONING AND FOOD PRESERVATION PURPOSES, PHASE 1 Final Report, Nov. 1978

Herbert Grallert, Manfred Herbricht, and Martin Margulies Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 91 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-165; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19,10

For the cooling power range of about 10 to 500 kW and for cooling temperatures of +20, 0, and -20 C, a comparison was made between solar heated absorption machines and compression machines, which are driven by a solar heated Rankine cycle. Comparison criteria are C.O.P., energy prices, and application risks. All partial efficiencies and costs were determinated by component analyses. For several cooling loads an annual system simulation was performed using MBB computer programs. Furthermore, the electric energy demand for absorption cooling systems was estimated and initial application recommendations are given. Author

N82-15542# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Stuttgart (West Germany). Inst. fuer Technische Physik.

HYDROGEN AS CARRIER OF SECONDARY ENERGY: PROPOSAL FOR A RESEARCH AND DEVELOPMENT PROGRAM

H. Buhl, C. Carpetis, J. Nitsch, W. Peschka, T. Schott, W. Seeger, W. Schnurnberger, H. Steeb, and H. J. Sternfeld Jun. 1981 94 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-732)

(DFVLR-Mitt-81-10) Avail: NTIS HC A05/MF A01; DFVLR, Cologne DM 14,20

The nuclear or solar production of hydrogen may become economically attractive in the future. The technological problems of the production and the introduction of hydrogen into the

energy system are shown. Suitable research development efforts are recommended to achieve a complete ensured scope of knowledge concerning hydrogen systems. A.R.H.

N82-15543# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.

ROLE OF LARGE SCALE ENERGY SYSTEMS MODELS IN R&D PLANNING

J. Lamontagne Nov. 1980 13 p refs Presented at the ORSA/TIMS Conf., Colorado Springs, 9 Nov. 1980

(Contract DE-AC02-76CH-00016)

(DE81-026058; BNL-29751; CONF-801126-3) Avail: NTIS HC A02/MF A01

The development of alternative technologies to provide new sources of energy and extend the lives of current ones is discussed. The influence of model results on energy policy makers who are not knowledgable about flaws or uncertainties in the models, errors in assumptions in model inputs which can result in faulty forecasts, the overall usefulness of energy system models, and model limitations are discussed. It is concluded that energy models should be clearly related to specific issues and methodologies should be clearly related to specific decisions, and allow adjustments to be easily made for alternative assumptions and for additional knowledge gained during the evolution of the energy system. DOE

N82-15544# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.

LOW-COST PASSIVE-SOLAR RETROFITS FOR NEW AND EXISTING MOBILE HOMES

Steve Brant and Michael Holtz Jul. 1981 6 p refs Presented at the 6th AS/ISES Natl. Passive Conf., Portland, Oreg., 8-12 Sep. 1981

(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)

(DE81-028356; SERI/TP-721-1138R; CONF-810925-17) Avail: NTIS HC A02/MF A01

Passive solar heating and cooling retrofit options can significantly reduce the energy consumption of new and existing mobile homes. The initial efforts of the Solar Energy Research Institute to explore the solar potential for the existing stock of mobile homes and those in the production stage are described. DOE

N82-15545# Midwest Research Inst., Golden, Colo.

INDUSTRIAL PROCESS HEAT APPLICATIONS FOR SOLAR THERMAL TECHNOLOGIES

David Feasby and David W. Kearney Jun. 1981 9 p refs Presented at the 3rd Intern. Conf. on Energy Use Management, West Berlin, 26 Oct. 1981

(Contract DE-AC02-77CH-00178)

(DE81-025934; SERI/TP-733-1278; CONF-811006-2) Avail: NTIS HC A02/MF A01

Selected solar industrial process heat (IPH) activities under development in the US are reviewed. Included are: a summary of the IPH field test program, status of solar thermal technologies, and results of specific technology/application matching and market studies. The near term viability of solar technologies in the industrial sector is dependent upon both the economic and technical issues which vary depending on the application, plant site, and system selected. DOE

N82-15546# Sandia Labs., Albuquerque, N. Mex.

SANDIA PROGRAM IN GEOTHERMAL TECHNOLOGY DEVELOPMENT

J. R. Kelsey and B. C. Caskey 1981 4 p refs Presented at the Geothermal Resources Council Ann. Meeting, Houston, Tex., 25 Oct. 1981

(Contract DE-AC04-76DP-00789)

(DE81-025394; SAND-81-1490C; CONF-811015-4) Avail: NTIS HC A02/MF A01

The accomplishments of the geothermal research program, the status of current projects, and plans for future activities are presented. The program includes R and D in high temperature rock penetration mechanics, drilling fluids borehole mechanics, and diagnostics technology. DOE

N82-15547# Coury and Associates, Inc., Denver, Colo.

FEASIBILITY ANALYSIS OF GEOTHERMAL DISTRICT HEATING FOR LAKEVIEW, OREGON Final Report

23 Dec. 1980 93 p refs Prepared for Northwest Geothermal Corp., Portland Oregon

(Contract DE-AC51-79ET-27229)

(DOE/ET-27229/T1) Avail: NTIS HC A05/MF A01

A substantial resource capable of supporting extensive residential, commercial and industrial heat loads is indicated. Good resource productivity is expected with water temperatures of 200 F at depths of 600 to 3000 feet in the immediate vicinity of the town. Preliminary district heating system designs were developed for a Base Case serving 1170 homes, 119 commercial and municipal buildings, and a new alcohol fuel production facility; a second design was prepared for a downtown Mini-district case with 50 commercial users and the alcohol plant. Capital and operating costs were determined for both cases. Initial development of the Lakeview system has involved conducting user surveys, well tests, determinations of institutional requirements, system designs, and project feasibility analyses. DOE

N82-15548# Battelle Pacific Northwest Labs., Richland, Wash.

COMPRESSED-AIR ENERGY-STORAGE TECHNOLOGY: PROGRAM OVERVIEW

L. D. Kannberg Jul. 1981 7 p Presented at the Mech., Magnetic and Underground Energy Storage Ann. Contractor's Rev. Meeting, Washington, D.C., 24 Aug. 1981

(Contract DE-AC06-76RL-01830)

(DE81-030103; PNL-SA-9780; CONF-810833-8) Avail: NTIS HC A02/MF A01

A new technology designed to reduce the consumption of oil in the generation of electric power was developed. The program has two major elements: reservoir stability studies and second generation concepts studies. The reservoir stability studies are aimed at developing stability criteria for long term operation of large underground reservoirs used for compressed air storage. The second generation concepts studies are aimed at developing new concepts that will require little or no petroleum fuels for operation. The program efforts are outlined and major accomplishments towards the objectives of the program are identified. DOE

N82-15549# Mound Lab., Miamisburg, Ohio.

CHARACTERIZATION OF RADIATION-CROSSLINKED, HIGH-DENSITY POLYETHYLENE FOR THERMAL ENERGY STORGE APPLICATIONS

Ruth B. Whitaker, Stephen M. Craven, Donald E. Etter, and Eugene F. Jendrek 1981 8 p refs Presented at the 11th North Am. Thermal Anal. Soc. Conf., New Orleans, 19 Oct. 1981

(Contract DE-AC04-76DP-00053)

(DE81-024915; MLM-2836-OP; CONF-811014-1) Avail: NTIS HC A02/MF A01

Characterization of the crosslinked, form stable high density polyethylene (HDPE) pellets produced by electron beam radiation crosslinking, and the effects of crosslinking on crystallinity and heat of fusion were studied. Methods used include differential scanning calorimetry, Fourier Transform Infrared Spectroscopy (FTIR), and X-ray diffraction measurements. It is indicated that the crosslinking occurs primarily in the amorphous regions of the polyethylene. The FTIR spectroscopy was used to estimate the relative amounts of crosslinking occurring with the varying radiation dosages, and the uniformity of crosslinking throughout the pellets. It is found that the amount of crosslinking from the outside to the center of the pellets is uniform, which assists in maintaining long term form stability in the pellets. DOE

N82-15550# Oak Ridge Associated Universities, Tenn.

INDIVIDUAL BIOMASS FACILITY REPORTS. SUPPLEMENT TO SOME EMPLOYMENT AND EARNINGS IMPLICATIONS OF REGIONAL BIOMASS ENERGY UTILIZATION: NEW ENGLAND AND THE CORNBELT STATES

Joanna R. Little, Sharon E. Bell, Larry M. Blair, Ruth M. Gove, Wayne Stevenson, and Robert F. Tamura Aug. 1981 155 p

(Contract DE-AC05-76OR-00033)

(DE81-028523; ORAU-181B) Avail: NTIS HC A08/MF A01

Research was conducted to determine the direct employment and earnings implications of regional biomass energy utilization. Details of the primary data collected during the course of the

investigation are provided. A case studies approach was used to observe and analyze various biomass energy systems. Visits were made to existing biomass facilities and data on their operation and employment requirements were collected. Information on planned or potential future facilities was also obtained. When this information was analyzed, a fairly accurate picture of the current situation as well as the rate and direction of future development in biomass was attained. Separate descriptions are included for each facility visited or for each interview obtained. The facility reports are organized according to fuel cycle (wood-fuel, alcohol-fuel, municipal solid waste facilities, others). DOE

N82-15551# Monsanto Research Corp., Dayton, Ohio.
LOW-COST MIRROR CONCENTRATOR BASED ON INFLATED, DOUBLE-WALLED, METALLIZED, TUBULAR FILMS Final Report
J. L. Schwendeman, G. L. Ball, III, J. W. Leffingwell, and C. E. McClung Jul. 1981 121 p refs
(Contract DE-AC04-78AL-04227)
(DE81-027813; MRC-DA-944; ALO-4227-6) Avail: NTIS HC A06/MF A01

A potentially low cost, inflatable plastic solar mirror concentrator based on segments of a cylinder joined along the length of the collector on a plane passing through the axis of the absorber tube was designed and built. This design results in a savings of approximately 40% in the amount of window and mirror material and in a savings of about 20% of the land area occupied by a single collector when compared to a fully cylindrical one. The type of construction permits the assembling of the mirror/window envelope to the collector without disturbing the collector frame, absorber tube, or the associated plumbing. Aluminum foil plastic laminates were used as an alternative to aluminized polyester films, because of their potential low cost and durability. Specially ultraviolet stabilized and polyester scrim reinforced flexible polyvinyl chloride film was developed for use as the outer cover material. DOE

N82-15552# SRI International Corp., Menlo Park, Calif.
EXPLORATORY STUDY OF COAL-CONVERSION CHEMISTRY Quarterly Report, 20 Jun. 1980 - 19 Sep. 1981
4 Mar. 1981 35 p refs
(DE81-016136; DOE/ET-14855/12) Avail: NTIS HC A03/MF A01

The mechanism of cleavage of key bond types present in coals, and catalysis of conversion in CO-H2O systems are described. Catalytic carbon-carbon and carbon-oxygen bond cleavage in coal related diphenylmethane and diphenyl ether structures were measured. The homogeneous scission of carbon-oxygen bonds in diphenyl ether structure was also studied. The CO-H2O conversion level is obtained with aqueous solutions either at a starting pH above 12.6 or in neutral solutions with water soluble catalysts present. Catalysts, including the potassium or sodium salts of molybdate, chromate, manganate, and tungstate was studied and it is found that all are effective in the 3000 to 6000 ppM range. The nitrate was converted to ammonium ion and formate was detected in the product aqueous phase. It is found that catalytic quantities of sodium formate in CO/H2O at pH 7 are effective in the conversion. DOE

N82-15553# Stoller (S. M.) Associates, New York.
POTENTIAL CONTRIBUTION OF CURRENTLY OPERATING NUCLEAR-FUELED ELECTRIC-GENERATING UNITS TO REDUCING US OIL CONSUMPTION
R. H. Koppe, Eric A. J. Olson, and Kenneth R. VanHowe 30 Sep. 1980 56 p Prepared for ORNL
(Contract W-7405-eng-26)
(DE81-030497; ORNL/Sub-80/40416/1) Avail: NTIS HC A04/MF A01

The prospect for performance improvement in the 62 operating light water reactors was examined. It is found that in the short term, capacity factor improvement of about 16 percent can be achieved, in response to a short term energy crisis. In the long term a gain of 18 percent can be achieved. Such gains represent a decrease in equivalent oil consumption of approximately 350,000 barrels a day. Potential increases in the operating power level of these units, are evaluated. This total short term power level increase would be equivalent to 138,000 barrels of oil per day. DOE

N82-15554# Department of Energy, Washington, D. C. Office of Energy Management and Extension.
ANNUAL REPORT TO THE PRESIDENT AND THE CONGRESS ON THE STATE ENERGY CONSERVATION PROGRAM FOR CALENDAR YEAR 1980
Jul. 1981 40 p
(DE81-025862; DOE/CE-0016) Avail: NTIS HC A03/MF A01

The activities of the fifth year's operation (December 1979 through December 1980) of the state energy conservation program are reported. The program requires states to develop and implement plans that will reduce projected energy consumption by 5% or more in 1980. Five program measures required to be eligible for financial assistance under the plan and three program measures under a supplemental plan are described and outlined. The details of program operation and results to date are reported. Program management in a description of selected innovative state Program measures are described. The President's Program for economic recovery is evaluated. DOE

N82-15555# Pacific Northwest Lab., Richland, Wash.
TECHNOLOGY CHANGE AND ENERGY CONSUMPTION: A COMPARISON OF RESIDENTIAL SUBDIVISIONS
L. A. Nieves and A. L. Nieves 1981 38 p Presented at the 56th Ann. Conf. of the Western Econ. Assoc., San Francisco, 2-6 Jul. 1981
(Contract DE-AC06-76RL-01830)
(DE81-030075; PNL-SA-9049; CONF-810757-2) Avail: NTIS HC A03/MF A01

The energy savings in residential buildings likely to result from implementation of the building energy performance standards (BEPS) were assessed. The goals were to: compare energy use in new homes designed to meet or exceed BEPS levels of energy efficiency with that in similar but older homes designed to meet conventional building codes, and to survey the home owners regarding their energy conservation attitudes and behaviors and to ascertain the degree to which conservation attitudes and behaviors are related to residential energy use. The consumer demand theory which provides the framework for the empirical analysis is presented. The sample residences are described and the data collection method discussed. The definition and measurement of major variables are presented. DOE

N82-15556# Minnesota Geological Survey, St. Paul.
MOORHEAD DISTRICT HEATING, PHASE 2 Final Report
R. E. Sundberg Jan. 1981 429 p refs
(Contract DE-AC02-78CS-20074)
(DE81-029689; DOE/CS-20074/1) Avail: NTIS HC A19/MF A01

The feasibility of developing a demonstration cogeneration hot water district heating system was studied. The district heating system would use coal and cogenerated heat from the Moorhead power plant to heat the water that would be distributed through underground pipes to customers or their space and domestic water heating needs, serving a substantial portion of the commercial and institutional loads as well as single and multiple family residences near the distribution lines. The technical feasibility effort considered the distribution network, retrofit of the power plant, and conversion of heating systems in customers' buildings to use hot water from the system. The system would be developed over six years. The economic analysis consisted of a market assessment and development of business plans for construction and operation of the system. Rate design methodology, institutional issues, development risk, and the proposal for implementation are discussed. DOE

N82-15557# Ames Lab., Iowa. Dept. of Materials Science and Engineering.
SOME THERMOELECTRIC PROPERTIES OF THE LIGHT RARE EARTH SESQUISELENIDES (R2Se/SUB3-X/)
T. Takeshita, B. J. Beaudry, and K. A. Gschneidner, Jr. 1981 5 p refs Presented at the IECEC Conf., Atlanta, 9-14 Aug. 1981
(Contracts W-7405-eng-82; WPAS-AE-15-25)
(DE81-025526; IS-M-329; CONF-810812-29) Avail: NTIS HC A02/MF A01

Rare earth sesquiselenides of the Th3P4 structure which show variable electric properties over their homogeneity range,

i.e., ranging from metallic to semimetallic to semiconducting were analyzed. The composition change is due to the formation of metal vacancies in the Th3P4 structure with no vacancies at R3Se4 and 4.75 at. % vacancies at R2Se3. The rare earth sesquiselenides are refractory materials and of interest for high temperature thermoelectric applications. Preliminary results of thermoelectric power and electrical resistivity measurements on the light lanthanide sesquiselenides are presented. DOE

N82-15558# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.

DESIGN AND ECONOMICS OF DIRECT-CONTACT SALT HYDRATE STORAGE SYSTEMS

John D. Wright May 1981 9 p refs Presented at the 2nd World Congr. of Chem. Eng., Montreal, 4-9 October 1981

(Contract EG-77-C-01-4042)

(SERI/TP-631-1163; CONF-811007-3) Avail: NTIS HC A02/MF A01

A salt hydrate latent heat storage system in which oil is injected at the bottom of the container and exhanges heat as it floats to the top where it is pumped back to the heat source is described. Two experiments are described: (1) to reliably inject the oil into the salt phase; and (2) to minimize the carryover of salt hydrate into the oil, which can be done using two stage coalescer filters. Three systems are described and compared: a standard liquid based sensible heat storage system, a latent heat storage design where oil is the heat transfer fluid throughout the system, and a latent heat storage system where ethylene glycol/water is used in the collectors and oil in the storage tank. DOE

N82-15559# Los Alamos Scientific Lab., N. Mex.

HOT DRY ROCK GEOTHERMAL PROSPECTS, 1981

F. Goff, A. W. Laughlin, J. Aldrich, M. E. Ander, B. H. Arney, E. Decker, J. Gardner, G. Heiken, A. J. Kron, C. M. LaDelfe et al 1981 5 p refs Presented at the Geothermal Resources Council Ann. Meeting, Houston, Tex. 25-29 Oct. 1981

(Contract W-7405-eng-36)

(DE81-025305; LA-UR-81-1807; CONF-811015-8) Avail: NTIS HC A02/MF A01

Sites within the USA as candidates for development of a second hot dry rock (HDR) geothermal system were assessed. Potential sites examined fall broadly into three categories according to the nature of their thermal anomalies: (1) quaternary magmahydrothermal (volcanic or igneous) systems; (2) regional thermal anomalies of tectonic origin; and (3) prequaternary plutonic and metamorphic complexes. Sites with both electrical generation and direct use potential were considered however, efforts were concentrated on electrical sites. DOE

N82-15560# Pacific Northwest Lab., Richland, Wash.

WIND SPEED SIMULATION FOR ECONOMIC EVALUATION OF WIND ENERGY CONVERSION SYSTEMS

J. V. Ramsdell, G. F. Athey, and M. Y. Ballinger Jul. 1981 14 p refs Presented at the 4th U.S. Natl. Conf. of Wind Eng. Res., Seattle, 26-29 Jul. 1981 Submitted for publication

(Contract DE-AC06-76RL-01830)

(DE81-030077; PNL-SA-9149; CONF-810742-3) Avail: NTIS HC A02/MF A01

A time series model was developed for the simulation of wind speeds. The model provides for the incorporation of systematic seasonal variation of the mean speed, standard deviation, and correlation of speeds. It also provides for incorporation of the systematic diurnal variation of the mean speed and the standard deviation. As a demonstration of the model capabilities, a number of simulations were using model parameters derived from data previously collected. The results of analyses of both sets of data, the simulated set and the real data, were compared. In general the major features found in the analyses of the real data are identifiable in the corresponding analyses of the simulated data. The primary difference between the two data sets is in the frequency of high wind speeds. The frequencies of hourly and daily average wind speeds greater than two standard deviations above the mean are underestimated slightly by the model. DOE

N82-15561# Sandia Labs., Albuquerque, N. Mex.

PROJECT DEEP STEAM: FOURTH MEETING OF THE TECHNICAL ADVISORY PANEL

R. L. Fox, A. B. Donaldson, S. W. Eisenhawer, C. M. Hart, D. R. Johnson, A. J. Mulac, J. R. Wayland, and L. J. Weirick Jul. 1981 104 p Proceedings of Meeting held at Albuquerque, N.Mex., 4-5 Nov. 1980

(Contract DE-AC04-76DP-00789)

(DE81-029457; SAND-81-0043) Avail: NTIS HC A06/MF A01

The status of project DEEP STEAM was reviewed. Proceedings, are divided into five main sections: (1) the injection string modification program; (2) the downhole steam generator program; (3) supporting activities; (4) field testing; and (5) recommendations and discussion. DOE

N82-15562# Oak Ridge National Lab., Tenn. Computer Sciences Div.

PREPARATION OF MAGNETIC ANOMALY PROFILE AND CONTOUR MAPS FROM DOE-NURE AERIAL SURVEY DATA. VOLUME 1: PROCESSING PROCEDURES

Eddie P. Tennel and William J. Hinze (Purdue Univ.) Sep. 1981 139 p refs

(Contract W-7405-eng-26)

(DE81-030700; ORNL/CSD/TM-155-Vol-1) Avail: NTIS HC A07/MF A01

Total intensity magnetic anomaly data acquired as a supplement to radiometric data in preparing regional profile and contour maps are discussed. Survey contractor supplied magnetic anomaly data are subjected to a multiprocess, computer based procedure. This procedure is used to produce the following machine plotted maps: (1) profile map of contractor supplied magnetic anomaly data; (2) profile map of high cut filtered data with contour levels of each profile marked and annotated on the associated flight track; (3) profile map of critical point data with contour levels indicated; and (4) contour map of filtered and selected data. DOE

N82-15563# Mid-American Solar Energy Complex, Minneapolis, Minn.

SOLAR ENERGY TRAINING PROGRAM FOR CODE ENFORCEMENT PERSONNEL

Jun. 1981 17 p

(Contract DE-AC02-79CS-30150)

(DE81-030053; MASEC-CF-81-023; P-101-12/A-101-4) Avail: NTIS HC A02/MF A01

A training program for building code officials is discussed. The development of a new model building code for solar was coordinated and course materials was developed. A manual to inform code officials about the basics of passive and active solar energy and the model code is developed Michigan was selected as the target state. DOE

N82-15564# Mid-American Solar Energy Complex, Minneapolis, Minn.

SUMMARY OF PASSIVE SOLAR MULTI-FAMILY DESIGN WORKSHOPS

Jun. 1981 14 p

(Contract DE-AC02-79CS-30150)

(DE81-030353; MASEC-CF-81-035; P-103-4) Avail: NTIS HC A02/MF A01

Instructional materials on the design, construction, and marketing of passive solar multi-family residential buildings were developed. An outline of the workbook used for the workshops is presented, along with a list of the workshops. Promotional activities are described briefly. DOE

N82-15565# Mid-American Solar Energy Complex, Minneapolis, Minn.

EVALUATION OF THE PASSIVE SOLAR FOR AGRICULTURE PROGRAM

Sep. 1981 5 p refs

(Contract DE-AC02-79CS-30150)

(DE81-030056; MASEC-R-81-045; P-107-1) Avail: NTIS HC A02/MF A01

The stimulation of the use of passive and hybrid solar energy for farm homes is discussed. Redirection of DOE emphasis limits the FY '81 program to information transfer on the topic to requesting groups and individuals. DOE

N82-15566# Los Alamos Scientific Lab., N. Mex.
OXIDATION OF METAL SULFITES BY IODINE FOR USE IN THERMOCHEMICAL HYDROGEN CYCLES
C. F. V. Mason and M. G. Bowman 1981 6 p refs Presented at the 4th Intern. Energy Agency Annex 1 Workshop on Thermochem. Hydrogen, Julich, West Germany, 23-25 Sep. 1981 Submitted for publication
(Contract W-7405-eng-36)
(DE81-030253; LA-UR-81-2477; CONF-810942-5) Avail: NTIS HC A02/MF A01

It is noted that thermochemical hydrogen cycles involving metal sulfates offer an alternative to sulfuric acid which is corrosive and has high energy requirements for drying prior to its thermal decomposition. The formation of such metal sulfates in conjunction with a low temperature hydrogen formation step is discussed. The following reaction was studied: MgSO3(c) + MgO(c) + I2(g) yields MgSO4(c) + MgI2(c). Although magnesium sulfite appears promising for this oxidation, a search was conducted for alternative metal sulfites which fit the following criteria for use: (1) sulfate must decompose in the temperature range available (< 1400 K); (2) iodide must hydrolyze easily; and (3) salts must not be rare, toxic, or expensive. Lanthanum and titanium fit these criteria. DOE

N82-15567# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.
MICRO-HYDROPOWER IN THE UNITED STATES
R. O. Haroldsen and F. B. Simpson 1981 9 p refs Presented at WATERPOWER 1981 Conf., Washington, D.C., 22 Jun. 1981
(Contract DE-AC07-76ID-01570)
(DE81-028271; EGG-M-02781; CONF-8106137-5) Avail: NTIS HC A02/MF A01

The interest and problems relating to the development of micro-hydropower, i.e., capacities of less than 100 kW, was assessed. A total of 62 individuals from 10 states and 4 groups, i.e., developers, A/E firms, equipment manufacturers, and state and federal agencies, were polled to determine their perceptions of the advantages and disadvantages of micro-hydro developments and the needs for such developments. Financing, technical assistance, and help with the economic analysis and regulatory aspects of micro-hydro development appeared to be the paramount needs. Whether or not a specific site can be successfully developed depends on site conditions. A micro-hydro plant discussed as an example is shown to be a poor investment, e.g., maximum $200 per month return on $60,000 investment. DOE

N82-15568# Pacific Northwest Lab., Richland, Wash.
SPECTRAL RESPONSE MEASUREMENTS FOR SOLAR CELLS
J. S. Hartman and M. A. Lind 1981 20 p refs From Com. Photovoltaics Meas. Workshop, Vail, Colo., 27-29 Jul. 1981
(Contract DE-AC06-76RL-01830)
(DE81-030097; PNL-SA-9751; CONF-810748-2) Avail: NTIS HC A02/MF A01

An overview of spectral response measurements, measurement systems, and potential measurement problems are described relative to the characterization of solar cells. Measurement systems are outlined for determining the spectral response, external quantum efficiency, and internal quantum efficiency of solar cells. Practical system components and measurement systems are presented along with their potential advantages and weaknesses. Finally, several solar cell properties (linearity, spatial uniformity, etc.) are discussed which must be considered before a measurement system can be designed to evaluate a specific type of solar cell. DOE

N82-15569# Midwest Research Inst., Golden, Colo. Photoconversion Research Branch.
PHOTOELECTROCHEMICAL SOLAR CELLS: STABILIZATION OF SMALL-BAND-GAP SEMICONDUCTOR IN AQUEOUS SOLUTION BY SURFACE-ATTACHED ORGANIC CONDUCTING POLYMER
Arthur J. Frank Sep. 1981 13 p refs Presented at the Intern. Conf. on Low-Dimensional Conductors, Boulder, Colo., 10-14 Aug. 1981
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE81-030312; SERI/TP-233-1388; CONF-810864-1) Avail: NTIS HC A02/MF A01

Surface-attached polypyrrole films are shown to produce a marked improvement in the stability of n-type single-crystal and polycrystalline Si against oxidation in an aqueous electrolyte. The current production of n-type polycrystalline Si coated with polypyrrole deteriorates less than 30% during 122 hr of irradiation whereas the unprotected bare electrode stops producing photocurrent within 30 s. The polymer protection of the n-type single-crystal Si is significantly less than that of the polycrystalline material because of differences in the adhesion of the polymer film to the electrode surfaces. The adhesion strength is shown to depend on various surface properties of Si and other electrode materials. Moreover, the surface morphology of the electrode affects the topography of the growing surface of the polypyrrole film. Requirements are discussed for the applications of organic conducting polymers to photoelectrochemical devices utilized for solar energy conversion. DOE

N82-15570# California Univ., Berkeley. Lawrence Berkeley Lab.
ENVIRONMENTAL PROGRAMS FOR OCEAN THERMAL ENERGY CONVERSION (OTEC)
P. Wilde Jul. 1981 10 p refs Presented at the Oceans 1981 Conf., Boston, 16 Sep. 1981
(Contract W-7405-eng-48)
(DE81-028876; LBL-12977; CONF-810911-2) Avail: NTIS HC A02/MF A01

The ocean thermal energy conversion (OTEC) which provides documented information on the effect of proposed operations on the ocean and the effect of oceanic conditions on the plant is discussed. The associated environment program consists of archival studies in potential areas serial oceanographic cruises to sites or regions of interest, studies from various fixed platforms at sites, and compilation of such information for appropriate legal compliance and permit requirements and for use in progressive design of OTEC plants. Four classes of environmental concerns are identified: (1) redistribution of oceanic properties; (2) chemical pollution; (3) structural effects and (4) socio-legal economic. DOE

N82-15571# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.
COMPARATIVE THERMAL PERFORMANCE OF DIRECT GAIN, TROMBE, AND SUNSPACE WALLS
H. T. Ghaffari and R. F. Jones 1981 8 p refs Presented at the 6th Natl. Passive Conf., Portland, Ore., 8-12 Sep. 1981 sap
(Contract DE-AC02-76CH-00016)
(DE81-030546; BNL-29970; CONF-810925-21) Avail: NTIS HC A02/MF A01

The natural thermal storage features of the Brookhaven superinsulated house were analyzed and verified. These include the Trombe and sunspace passive-solar-collection walls and the superinsulated south-facing wall. The thermal contributions of each system were demonstrated. Several thermal characteristic factors, in relation to each design for the hourly and daily period, were assessed. Further, the interior temperature fluctuations and the reductions in the required auxiliary energy with regard to incorporated passive designs were evaluated. T.M.

N82-15572# Department of Energy, Washington, D. C. Office of the Assistant Secretary for Conservation and Renewable Energy.
ANNUAL DOE ACTIVE SOLAR HEATING AND COOLING CONTRACTORS REVIEW MEETING
Sep. 1981 286 p refs Proc. of Conf. held in Washington, D.C., Sep. 1981
(DE81-028052; CONF-810912) Avail: NTIS HC A13/MF A01

Ninety three project summaries dicussing the following aspects of active solar heating and cooling are presented: Rankine solar cooling systems; absorption solar cooling systems; desiccant solar cooling systems; solar heat pump systems; solar hot water systems; special projects (such as the National Solar Data Network, hybrid solar thermal/photovoltaic applications, and heat transfer and water migration in soils); administrative/management support; and solar collector, storage, controls, analysis, and materials technology. DOE

N82-15573# Eureka Labs., Inc., Sacramento, Calif.
HEATING AND COOLING APPLICATIONS OF ATRIUMS AND ATTACHED GREENHOUSES: A STATE-OF-THE-ART REPORT
Dec. 1980 113 p refs
(Contract DE-AC03-80SF-11511)
(DE81-022181; DOE/SF-11511/T1) Avail: NTIS HC A06/MF A01

The current state-of-the-art in atrium designs is described and its deployment status throughout the US is reported. Individual and computer subject searches of atriums and greenhouse were completed. An annotated bibliography of each reference reviewed was prepared and are listed in three categories: system characteristics; existing attached greenhouses and atriums, and current greenhouse design criteria. Atriums are defined; a classification scheme was developed; and operating modes are discussed. Atrium locations are identified by region. Simplified approaches to sizing atrium elements, emphasizing greenhouse materials, are discussed. DOE

N82-15574# Los Alamos Scientific Lab., N. Mex.
PASSIVE-SOLAR RETROFIT STUDY FOR THE UNITED STATES NAVY
William O. Wray and Charles R. Miles (Naval Civil Engineering Lab., Port Hueneme) 1981 6 p ref Presented at the Solar World Forum, Brighton, U.K., 23-28 Aug. 1981
(Contract W-7405-eng-36)
(DE81-030250; LA-UR-81-2500; CONF-810865-3) Avail: NTIS HC A02/MF A01

The purpose of the study was to determine the energy savings obtainable in concrete block buildings from several passive solar heating strategies. A procedure involving the use of test cell data and computer simulation was employed to assess the merits of six retrofit options. The six strategies selected were chosen on the basis of providing a series of options that will deliver increasing energy savings at the cost of correspondingly increased levels of commitment. DOE

N82-15575# California Univ., Berkeley. Lawrence Berkeley Lab.
INCREMENTAL COOLING LOAD DETERMINATION FOR PASSIVE DIRECT GAIN HEATING SYSTEMS
Paul W. Sullivan, Douglas Mahone, Winslow Fuller, James Gruber, Ron Kammerud, Wayne Place, and Brandt Anderson May 1981 5 p refs Presented at the Am. Sect. of the Intern. Solar Energy Soc., Philadelphia, 27-30 May 1981
(Contract W-7405-eng-48)
(DE81-029882; LBL-12048; CONF-810509-40) Avail: NTIS HC A02/MF A01

The applicability of the National Association of Home Builders (NAHB) full load compressor hour method for predicting the cooling load increase in a residence attributable to direct gain passive heating systems is examined. The NAHB method predictions are compared with the results of 200 hour-by-hour simulations using BLAST, and the two methods show reasonable agreement. The degree of agreement and the limitations of the NAHB method are discussed. DOE

N82-15576# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
SERI SOLAR-ENERGY-STORAGE PROGRAM
Charles E. Wyman Aug. 1981 3 p refs Presented at the Ann. DOE Active Solar Heating and Cooling Contractors Rev. Meeting, Washington, D.C., 14-16 Sep. 1981
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE81-029476; SERI/TP-620-1344; CONF-810912-11) Avail: NTIS HC A02/MF A01

The program provides research, system analysis, and assessments of thermal energy storage and transport in support of the Thermal Energy Storage Program of the DOE Division of Energy Storage Technology; emphasis is on thermal energy storage for solar thermal power and process heat applications and on thermal energy transport. Currently, research is in progress on direct-contact thermal energy storage and thermochemical energy storage and transport. In addition, SERI is directing the definition of new concepts for thermal energy storage and supporting research on thermal energy transport by sensible and latent heat media. SERI is performing systems analyses of thermal energy storage for solar thermal application and coordinating thermal energy storage activities for solar applications. DOE

N82-15577# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
OVERVIEW OF ACTIVE SOLAR ABSORPTION/RANKINE COOLING PROGRAM
Michael Wahlig, Al Heitz, Harry Angerman, Ron Glas, and Mashuri Warren Jul. 1981 7 p Presented at the Active solar Contractors' Review Meeting, Washington, D.C. 9-12 Sep. 1981; sponsored by DOE
(Contract W-7405-eng-48)
(DE81-028041; LBL-13054-Rev; CONF-810912-13) Avail: NTIS HC A02/MF A01

The individual absorption and Rankine projects along with the main features and accomplishments/status of each and future plans were identified. The absorption program, was three active component development projects, four systems field test projects, one advanced fluid study project and one advanced cycle study project. Rankine program, includes five active component development projects, two system field test projects, and one advanced study project. DOE

N82-15578# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.
VERIFICATION OF BLAST BY COMPARISON WITH MEASUREMENTS OF A SOLAR-DOMINATED TEST CELL AND A THERMALLY MASSIVE BUILDING
Brandt Andersson, Fred Bauman, William Carroll, Ronald Kammerud, and Nina Friedman Apr. 1981 12 p refs Presented at the 3rd Ann. Systems Simulation and Econ. Anal. Operational Results Conf., Solar Energy Div., Reno, Nev., 27 Apr. - 1 May 1981; sponsored by ASME
(Contract W-7405-eng-48)
(DE81-029883; LBL-11387; CONF-810405-16) Avail: NTIS HC A02/MF A01

Temperatures were compared in a direct solar gain test cell and temperatures were predicted. The comparisons were performed for two distinct climate period. The test cell configuration and weather data manipulations, quantitative evaluations of the comparisons between measured and predicted interior temperatures, limitations of the comparisons, and sensitivities of the simulation results to uncertainties in the measured parameters are examined. In the second study, comparisons of BLAST predictions to temperatures and loads measured in a massive structure were carried out. The tests verifying the program's ability to: (1) calculate full scale building loads; and (2) accurately model hybrid cooling using forced ventilation. DOE

N82-15579# Ames Lab., Iowa.
TRANSWALL: A MODULAR VISUALLY TRANSMITTING THERMAL STORAGE WALL Status Report
J. F. McClelland, R. W. Mercer, L. Hodges, R. F. Szydlowski, P. H. Sidles, R. G. Struss, J. R. Hull (Argonne National Lab., Ill.), and D. A. Block 1980 8 p refs Presented at the Intern. Solar Energy Soc. Conf., Brighton, England, 24-27 Aug. 1980
(Contract W-7405-eng-82)
(DE81-029821; IS-M-345; CONF-8008123-1) Avail: NTIS HC A02/MF A01

The Transwall a semitransparent thermal storage wall system that offers a number of advantages over conventional direct gain and Trombe wall approaches is examined. Progress is reported in the design, fabrication, installation, and operation of a glass and aluminum prototype system. A facility for year round performance testing of the system is described and preliminary summer season thermal test data are presented. Thermal performance modeing results that predict heat loss reduction with a heat mirror coating on Transwall to be comparable to that obtained with R6 night insulation are reported. DOE

N82-15580# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
OVERVIEW AND FY 1981 PROGRESS ON OPEN-CYCLE OTEC POWER SYSTEMS
T. R. Penney and B. Shelpuk Aug. 1981 7 p refs Presented at the Oceans Conf., Boston, 19-21 Sep. 1981
(Contract EG-77-C-01-4042)
(DE81-029277; SERI/TP-634-1282; CONF-810911-3) Avail:

NTIS HC A02/MF A01

Progress in an advanced research and development program studying viable alternatives to closed cycle OTEC is reported. Work on a 100 MWe steam turbine, heat exchangers, and deaeration for Claude or open cycle OTEC systems are reported. Capsule descriptions of ocean energy conversion techniques are given, including wave energy conversion, ocean current energy conversion, and salinity gradient energy conversion as well as varieties of ocean thermal energy conversion. DOE

N82-15581# Los Alamos Scientific Lab., N. Mex.

USE OF OXIDE DECOMPOSITIONS IN ADVANCED THERMOCHEMICAL HYDROGEN CYCLES FOR SOLAR HEAT SOURCES. APPLICATION OF THE TRICOBALT TETRAOXIDE-COBALT MONOXIDE PAIR

W. M. Jones and M. G. Bowman 1981 9 p refs Presented at Intern. Energy Agency Annex 1 Workshop on Thermochem. Hydrogen, Julich, West Germany, 23 Sep. 1981

(DE81-030235; LA-UR-81-2628; CONF-810942-6) Avail: NTIS HC A02/MF A01

The concept of utilizing oxide decompositions in advanced thermochemical hydrogen cycles for solar heat sources is introduced. It allows direct transmission of energy to the process through an air window. Reaction (2) gives a high concentration of MgI2 that would be favorable for (3). The solutions contain iodine dissolved as polyiodide, partly offsetting this advantage. It is indicated that reaction (2) is slow at 150 C. It is surmised that the mechanism of (2) consists of the iodine disproportionation reaction (6), followed by reaction (7). It was found that (6) was relatively fast and with a good yield at 150 C. Reaction (7) is sufficiently slow at 150 C to account for the slowness of (2). The yield of (7) is proportional to the square root of the time, suggesting that iodate must diffuse through an adherent, accumulating C0304 layer. DOE

N82-15582# Texas Univ., Austin. Fusion Research Center.

KINETIC THEORY OF ALFVEN WAVE HEATING

David W. Ross, G. L. Chen, and S. M. Mahajan Feb. 1981 7 p refs Presented at the 4th Topical Conf. on Radio Freq. Plasma Heating, Austin, Tex., 9-11 Feb. 1981

(Contract DE-AC05-76ET-53036)

(DE81-029777; DOE/ET-53036/25; CONF-810214-10) Avail: NTIS HC A02/MF A01

The heating of Tokamak plasmas by Alfven waves in cylindrical geometry using linearized kinetic equations was studied. The energy deposition and density fluctuations as functions of the plasma radius, as well as the total impedance for the experiments on the PRETEXT Tokamak are computed. Optimum conditions for heating are investigated. DOE

N82-15583# Vereinigte Elektrizitaetswerke Westfalen A.G., Dortmund (West Germany). Bereich Marketing.

ENERGY CONSUMPTION ANALYSIS AND COMPARATIVE STUDY OF THE OPERATIONAL RESULTS FROM HEAT PUMP PLANTS Final Report, Oct. 1979

Peter Mueller, Bernd Bewer, Heinz Klaus, Walter Sander, and Hans Joachim Guenther Wirthwein Bonn Bundesministerium fuer Forschung und Technologie Dec. 1980 240 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-80-109; ISSN-0340-7608) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 40,50

Electric energy consumption with inclusion of the electricity consumption of the supplementary and auxiliary equipment is considered. Costs are divided into plant costs for heat pumps, heating systems and auxiliary equipment, installation costs for heat pumps, heating systems and auxiliary equipment, operating costs and maintenance costs. Specific energy consumption and cost statements were determined. Operational experiences were reviewed and the energetic operational behavior, including supplementary and auxiliary equipment for a random test of plants, is discussed. Author (ESA)

N82-15584# Institut fuer Kemtechnik und Energiewandlung e.V., Stuttgart (West Germany).

DEVELOPMENT OF A MODULAR HEAT EXCHANGER WITH INTEGRATED LATENT HEAT ENERGY STORE Final Report, Dec. 1979

Ashok Abhat, Dietmar Heine, Manfred Heinisch, Nikolaus A. Malatidis, and Guenther Neuer Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 247 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(Contract BMFT-PLE-ET-4060-A)

(BMFT-FB-T-81-050; ISSN-0340-7608) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 41,10

Latent heat storage materials and appropriate heat exchangers for solar heating applications, such as house heating and domestic hot water production were investigated. The melting and freezing characteristics and the effects of thermal cycling on a total of 12 substances, including paraffins, fatty acids and salt hydrates, were investigated and their corrosive interaction with five conventional construction materials was determined. The poor thermal conductivity of the heat storage materials requires the development of a modular finned heat pipe heat exchanger with increased heat transfer characteristics. A cost analysis is provided and comparisons with hot water storage indicate that latent heat storage has the potential of becoming economically more attractive than the former for domestic hot water production. Author (ESA)

N82-15585# Deutsche Automobilgesellschaft m.b.H., Esslingen (West Germany).

DEVELOPMENT OF GAS PHASE METALLIZED PLAQUES FOR ELECTRODES OF STORAGE BATTERIES, IN PARTICULAR FOR NICKEL OXIDE ELECTRODES Final Report, Jul. 1979

Rolf Linkohr and Herman Schladitz (Physikalisch-Chemisch Forchungslab.) Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 87 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-053; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18,30

Nickel oxide electrode plaques for alkaline batteries were developed by nickel carbonyl vapor deposition plating on large fiber plaque substrates made of carbon. The most promising technique is the one in which carbonyl gas flows continuously through the carbon felt, allowing continuous processing as well as improved uniformity of the nickel distribution. Structural strength, electrical resistance, heat conduction, and gas permeation of the plaques were approximated by simple models which are borne out by experimental comparison it is indicated that electrochemical measurements in half cell arrangements are reached for nickel savings, capacity per unit area, and current capability. Author (ESA)

N82-15586# Varta Batterie A.G., Kelkheim (West Germany). Forschungs- und Entwicklungszentrum.

EXPERIMENTAL STUDY FOR RECHARGEABLE SEALED Ni/Cd WATCH BATTERIES Final Report

Helmut Haelbig Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 87 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-129; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 18,30

The potential feasibility of using Ni/Cd cells as energy storage devices in electronic wrist watches powered by solar cells was evaluated. It is shown that the necessary special requirements can only be met, if the following conditions are fulfilled: a minimal capacity of 35 mAh in a cell of the dimensions 11,4 mm in diameter and 5,1 mm in height; and a hermetic seal to prevent leakage. Long periods of overcharge with currents higher than 50 microns must be avoided in order to achieve a service life of 10 years. The minimal charge current must be 350 mA to provide an autonomy of 6 months, with a discharge current of 5 micro A. J.M.S.

N82-15587# Intermountain Forest and Range Experiment Station, Ogden, Utah.

DOWNED DEAD WOODY FUEL AND BIOMASS IN THE

NORTHERN ROCKY MOUNTAINS
James K. Brown and Thomas E. See Jul. 1981 52 p refs
(PB81-240517; FSGTR/INT-117) Avail: NTIS HC A04/MF A01 CSCL 02F

Weights and volumes of downed woody material in diameter classes of one-fourth to 1, 1 to 3, and greater than 3 inches and forest floor duff depths were summarized from extensive inventories in nothern Idaho and Montana. Biomass loadings are shown by cover types and habitat types within National Forests. Total downed woody biomass ranged from 5 tons per acre in ponderosa pine to 33 tons per acre in cedar-hemlock. Loadings generally increased with increased productivity, but varied greatly with stand age. Fuels tended to become predictably high in overmature stands but unpredictable in young, immature, and mature stands. Forest fuel succession is discussed in relation to tree mortality, fuel buildup, and depletion. GRA

N82-15588# Iowa State Univ. of Science and Technology, Ames. Engineering Research Inst.
THE CONVERSION OF AGRICULTURAL BY-PRODUCTS TO SUGARS Final Report
Peter J. Reilly Mar. 1981 200 p refs
(Contract NSF PFR-77-00198)
(PB81-241432; ISU-ERI-AMES-81188; NSF/CPE-81008) Avail: NTIS HC A09/MF A01 CSCL 02A

The following objectives were attained: optimizing the immobilization of beta-xylosidase; determining the effects of temperature and pH on the activity and stability of immobilized beta-xylosidase and comparing the results with those from soluble beta-xylosidase; and preparing model substrates of known composition. A summary of what is known about the xylanase family is given. A comprehensive literature search of the catalytic properties of the glycoside glycohydrolase family, of which beta-xylosidase is a member, is presented. Results on the purification, immobilization, and characterization of beta-xylosidase are given. An overview of the purification of various xylanases is supplied. The purification and characterization of the five homogeneous xylanases purified in this study are detailed. GRA

N82-15589# Mitre Corp., McLean, Va. Metrek Div.
ENERGY AND DEVELOPMENT IN CENTRAL AMERICA. VOLUME 1: REGIONAL ASSESSMENT Final Report, Oct. 1979 - Feb. 1980
Wayne Park, Wayne Park, Carole Neves, Ranvir Trehan, William Gallagher, Phillip Palmedo, Andres Doernberg, Keith Oberg, and Steven Kyle Feb. 1980 128 p refs Prepared in cooperation with Energy/Development International 2 Vol.
(Contract AID/SOD/PDC-C-0146)
(PB81-231540; MTR-80W601-Vol-1) Avail: NTIS HC A07/MF A01 CSCL 10A

A regional energy assessment of six Central American countries is presented. The purpose is to assist these countries in defining, planning, and meeting energy requirements implicit in their economic and social development goals. The following topics are treated: Central America Regional energy assessment; energy issues; geographical, social, and economic aspects; energy resources; current energy use and future energy use; energy strategies. GRA

N82-15590# Mitre Corp., McLean, Va. METREK Div.
ENERGY AND DEVELOPMENT IN CENTRAL AMERICA. VOLUME 2: COUNTRY ASSESSMENTS Final Report, Oct. 1979 - Feb. 1980
Wayne Park, Carole Neves, Ranvir Trehan, William Gallagher, Phillip Palmedo, Andres Doenberg, Keith Oberg, and Steven Kyle Mar. 1980 350 p refs Prepared in cooperation with Energy/Development International 2 Vol.
(Contract AID/SOD/PDC-C-0146)
(PB81-231557; MTR-80W602-Vol-2) Avail: NTIS HC A15/MF A01 CSCL 10A

An energy assessment for each of six Central American countries - Guatemala, El Savador, Honduras, Nicaragua, Costa Rica, and Panama is presented. The program assists the U.S. Agency for International Development and other development organizations in defining energy programs in Central America. The following issues are treated separately for each individual country; geographic, social and economic aspects; energy resources; current and future energy use; energy strategies. GRA

N82-15591# Tata Inst. of Fundamental Research, Bombay (India). Documentation Centre.
INDIAN ENERGY ABSTRACTS
Mar. 1981 46 p
(PB81-232316) Avail: NTIS HC A03/MF A01 CSCL 10A

The document provides abstracting coverage of scientific and technical energy literature originating from Indian Government Departments, Universities, National Laboratories, and other research institutions including industries. The scope encompasses all forms of renewable sources of energy and more efficient and less polluting use of fossil and fissile fuels. DOE

N82-15592# National Academy of Sciences - National Research Council, Washington, D. C. Advisory Committee on Technology Innovation.
SUPPLEMENT TO ENERGY FOR RURAL DEVELOPMENT: RENEWABLE RESOURCES AND ALTERNATIVE TECHNOLOGIES FOR DEVELOPING COUNTRIES Final Report
1981 248 p refs
(Contract AID/TA-C-1433)
(PB81-231011; CIR/BOSTID/38) Avail: NTIS HC A11/MF A01 CSCL 10A

The publication energy for rural development: renewable resources and alternative technologies for developing countries, which presented information on a variety of subjects, including direct uses of solar energy (heating, cooling, distillation, crop drying, photovoltaics), indirect uses of solar energy (wind power, hydropower, photosynthesis, biomass), geothermal energy, and energy storage is reviewed. New technologies developed and advances made in technologies are discussed. GRA

N82-15593# TRW Energy Systems, Redondo Beach, Calif.
SAMPLING AND ANALYSIS OF POTENTIAL GEOTHERMAL SITES Final Report, Apr. 1978 - Apr. 1979
R. Sung, G. Houser, D. Strehier, and K. Scheyer Aug. 1981 205 p refs
(Contract EPA-68-03-2560)
(PB81-240061; EPA-600/7-81-138) Avail: NTIS HC A10/MF A01 CSCL 08I

Information on the physical, chemical and radiochemical data of geothermal manifestations (wells and springs) in areas with the most probable potential for development was documented. The information can be used to evaluate control technologies and to ultimately establish emission/discharge standards for the emerging geothermal industry. GRA

N82-15594# Bureau of the Census, Washington, D. C.
FUELS AND ELECTRIC ENERGY CONSUMED
Feb. 1981 25 p
(PB81-240442; MIC-77-SR-5) Avail: NTIS HC A02/MF A01 CSCL 08I

The following topics on energy consumption are reported: general summary, type of operation, size of establishment, type of organization, assets and capital expenditures, fuels and electric energy consumed, and water use. GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N82-15595 Deutscher Wetterdienst, Offenbach am Main (West Germany).
REPORTS FROM THE GERMAN METEOROLOGICAL SERVICE. NUMBER 154: STATISTICS OF THE MAXIMUM MIXING HEIGHT ACCORDING TO RADIOSONDE MEASUREMENTS FOR THE AEROLOGICAL STATIONS OF THE GERMAN METEOROLOGICAL SERVICE FOR THE PERIOD 1957-1973 [BERICHTE DES DEUTSCHEN WETTERDIENSTES, NR 154: STATISTIK DER MAXIMALEN MISCHUNGSSCHICHTHOEHE NACH RADIOSONDENMESSUNGEN AN DEN AEROLOGISCHEN STATIONEN DES DEUTSCHEN WETTEDIENSTES IM ZEITRAUM 1957-1973]
Anneliese Gutsche and Christiana Lefebvre 1981 56 p refs In GERMAN; ENGLISH summary
(ISSN-0072-4130; ISBN-3-88148-186-9) Avail: Issuing Activity

As MMH is the upper limit of the atmospheric layer in which vertical mixing through convection occurs, it is a measure of the atmospheric dispersion and dilution capability of air pollution. As air pollution is more critical on dry days, days with precipitation and/or temperature decrease at the surface after the radiosonde ascent were treated separately and in less detail. The daily values of MMH were divided in 200 and 500 m classes and mean numbers of occurrences of each class were computed for months, seasons and the year as well as monthly averages. The results are represented in tables and diagrams and discussed. Seasonal and regional effects on the formation of the mixing height are identified. Selected weather situations are discussed and the correlation between mixing height and pollution level is established. Author (ESA)

N82-15596# Prins Maurits Lab. TNO, Rijswijk (Netherlands). Inst. voor Chemische en Technologische Research.
POLLUTION OF THE SOIL BY AVIATION GASOLINE
A. Verweij Aug. 1979 26 p ref In DUTCH; ENGLISH summary
(Contract A78/KL4/146)
(PML-1979-41; TDCK-73390) Avail: NTIS HC A03/MF A01

A literature search was conducted to determine the effects of aviation gasoline spills and more general oil spills on the environment and on the condition of oil storage tanks. Remedial measures are presented. Attention is given to natural restoration processes as well as to actions to speed up these processes. Author

N82-15597# Mainz Univ. (West Germany). Inst. fuer Arbeits- und Sozialmedzin.
RESULTS OF THE THIRD INTERNATIONAL CONGRESS ON NOISE EFFECTS: AS A PUBLIC HEALTH PROBLEM; BIOLOGICAL DISTURBANCES; EFFECTS ON BEHAVIOR Final Report, Feb. 1979
Sieglinde Rehm, Gerd Jansen, Eckhard Gros, and Barbara Griefahn Bonn Bundesministerium fuer Forschung und Technologie Oct. 1981 44 p In GERMAN; ENGLISH summary Presented at Freiburg, West Germany, 25-29 Sep. 1978 Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-81-013; ISSN-0171-7618) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9.30

The essentials of the German governmental program on humanization at work-places as well as noise effects research since the Dubrovnik-Congress 5 years ago were presented by about 100 scientists from different countries all over the world. Topics cover: (1) noise induced hearing loss; (2) noise and communication; (3) noise induced extraaural physiological effects; (4) influence of noise on efficiency and behavior; (5) noise induced disturbances of sleep; (6) noise induced community reactions; (7) noise and animals; and (8) noise and other physical and/or chemical agents affecting men. Proposals for near future research requirements and priorities of noise effects research are developed. Author

N82-15598# Battelle Pacific Northwest Labs., Richland, Wash.
ECOLOGICAL EFFECTS ASSESSMENT: REQUIREMENTS VS STATE-OF-THE-ART
D. H. McKenzie, J. M. Thomas, and L. L. Eberhardt May 1981 31 p refs Presented at the 3rd Conf. on Waste Heat Management and Utilization, Miami, Florida, 12 May 1981
(Contract DE-AC06-76RL-01830)
(DE81-028092; PNL-SA-9292; CONF-810545-5) Avail: NTIS HC A03/MF A01

Current requirements and the state-of-the-art in ecological effects assessments in regard to nuclear power plants are studied. The current cooling system approaches, data collection programs, and ecological effects assessments are discussed. A timely review and evaluation of current practice is called for. The magnitude of economic and environmental resources being committed to cooling system alternatives mandates that the decision-making process result in as many optimal choices as possible. In addition, the resources being devoted to environmental data collection and integration provide considerable motivation for providing meaningful input to the decision-making process. It is maintained that the input should be as quantitative and as free from subjective content as is reasonably possible. An alternative viewpoint suggests that the past several decades of experience be considered but a first step, and the current task to be one of designing a second step. DOE

N82-15599# Battelle Pacific Northwest Labs., Richland, Wash.
EVALUATION OF THE USEFULNESS OF ECOLOGICAL SIMULATION MODELS IN POWER PLANT IMPACT ASSESSMENT
G. L. Swartzman, R. T. Haar, and D. H. McKenzie May 1981 12 p refs Presented at the Intern. Symp. on Energy and Ecological Modelling, Louisville, Ky., 20 Apr. 1981
(Contract DE-AC06-76RL-01830)
(PNL-SA-9098; CONF-810488-2) Avail: NTIS HC A02/MF A01

Comparisons were made of the equations, rationale, data sources, and parameter values of 26 simulation models of fish and zooplankton population dynamics and energetics and results were compared in standard notation and units, process by process. The major process categories considered were composition, predation, metabolic processes, assimilation, growth, fecundity, recruitment, and mortality. A model simulation language was built to compare model equations process by process allowing convenient interchange of model equations for any process module. This simulator was parameterized to a test site, Lake Keowee, South Carolina, on which resides the Oconee nuclear power station. Model parameter estimation and comparison of these models with biological monitoring data allows evaluation of ecosystem models from the standpoint of prediction of behavior under normal and perturbed conditions, organization of data into an ecosystem framework, and evaluation of data to address impact questions. DOE

N82-15600# Battelle Pacific Northwest Labs., Richland, Wash.
SPECIATION OF AQUEOUS CONTAMINANTS - ROLE OF THE GEOCHEMICAL MODEL
Everett A. Jenne Jul. 1981 15 p refs Presented at the NBS Workshop on Aqueous Speciation of Dissolved Contaminants, Gaithersburg, Md., 18-20 May 1981
(Contract DE-AC06-79RL-01830)
(DE81-029976; PNL-SA-9584; CONF-810588-4) Avail: NTIS HC A02/MF A01

It is noted that a combination of accurate, selected analytical determinations and a competent geochemical model constitutes a means of achieving a thorough and reliable aqueous speciation of waters for the evaluation of societal risks resulting from anthropogenic inputs from energy related technologies. A reliable calculation of the distribution of species requires analytical determination of: (1) the quantity of each element in true solution; and (2) the amount of quantitatively and/or environmentally important aqueous species which are in disequilibrium. Due to the: (1) very numerous organic compounds which may be present; (2) the absence of Gibbs free energy and enthalpy data defining the association of these organic compounds with trace and major elements; and (3) the lack of competence of speciation-solubility models for organic ligands, the quantity of organic, trace-element complexes must, at the moment, be addressed analytically. DOE

N82-15601# Notre Dame Univ., Ind. Dept. of Civil Engineering.
HYDRODYNAMIC AND CHEMICAL MODELING OF HEAVY METALS IN ASH POND LEACHATES Progress Report, 1 Jul. 1980 - 31 Aug. 1981
Thomas L. Theis, David J. Kirkner, and Aaron A. Jennings Aug. 1981 55 p refs
(Contract DE-AC02-79EV-10253)
(DE81-028510; DOE/EV-10253/2) Avail: NTIS HC A04/MF A01

Models which are capable of describing both the physical and chemical factors which affect the transport of solutes through a porous media were developed. Complex solution and soil chemical interactions which are known to be of importance in the leachates and soils associated with wastes produced from energy production are emphasized. One dimensional saturated flow multi-solute finite element models for flow in a homogeneous medium were developed. The derivation of the governing equations is summarized and the numerical techniques and algorithms used to achieve a solution are described. DOE

N82-15602# California Univ., Livermore. Lawrence Livermore Lab.

THREE-DIMENSIONAL, FINITE ELEMENTAL MODEL FOR SIMULATING HEAVIER-THAN-AIR GASEOUS RELEASES OVER VARIABLE TERRAIN

Robert L. Lee, Philip M. Gresho, Stevens T. Chan, and Craig D. Upson Aug. 1981 17 p refs Presented at the NATO/CCMS 12th Intern. Tech. Meeting on Air Pollution Modeling and its Applications, Menlo Park, Calif., 25-28 Aug. 1981 Submitted for publication

(Contract W-7405-eng-48)

(DE81-028689; UCRL-85520; CONF-810841-1) Avail: NTIS HC A02/MF A01

A 3 dimensional finite element model was developed to predict the dispersion processes associated with heavier than air gaseous releases in the atmosphere. Both 2 dimensional and 3 dimensional examples presented to demonstrate the flexibility of the model in simulating the motion of the vapor cloud generated after a liquid natural gas spill over flat or variable terrain. Also presented are results to justify the slightly more complex generalized anelastic model rather than one employing the Boussinesq and/or hydrostatic approximation, which are routinely used for planetary boundary layer flows but can be inappropriate for this application. DOE

N82-15603# California Univ., Berkeley. Lawrence Berkeley Lab.

X-RAY METHODS FOR THE CHEMICAL CHARACTERIZATION OF ATMOSPHERIC AEROSOLS

J. M. Jaklevic and A. C. Thompson May 1981 20 p refs Presented at the Conf. on X- and Gamma-Ray Sources and Appl., Ann Arbor, Mich., 10 Jun. 1981 Sponsored in part by EPA

(Contract W-7405-eng-48)

(DE81-028874; LBL-12493; CONF-810647-10) Avail: NTIS HC A02/MF A01

The use of X-ray methods for the chemical characterization of atmospherical aerosol particulate samples are described. The methods are based on the emission, absorption, and scattering of X-ray photons emphasizing optimization for the nondestructive analysis of dilute specimens. Techniques include: photon induced energy dispersive X-ray fluorescence, extended X-ray absorption fine structure spectrocopy using synchrotron radiation and high rate X-ray powder diffractometry using a position sensitive gas proportional counter. The chemical compositions of size segregated aerosol particulate samples obtained with dichotomous samples were measured by one X-ray analysis method. The multiple elemental analyses obtained from X-ray fluorescence can be used as a cross check on the major compounds observed by powder diffraction. DOE

N82-15604# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.

REAL-TIME COARSE-PARTICLE MASS MEASUREMENTS IN A HIGH-TEMPERATURE/PRESSURE COAL-GASIFIER PROCESS TREATMENT

J. Wegrzyn, J. Saunders, and W. Marlow 1981 7 p Presented at the Conf. on High Temp., High Pressure Particulate and Alkali Control in Coal Combust. Process Streams, Morgantown, W. Va., 3-5 Feb. 1981

(Contract DE-AC02-76CH-00016)

(DE81-030039; BNL-29953; CONF-810261-1) Avail: NTIS HC A02/MF A01

A sampling system that employs a probe appropriate for direct extracted sampling of erosive range particulate matter from a coal gasifier outlet or a high pressure fluidized bed combustor was constructed. The sampling system consists of four modules: (1) a null balance extractive probe with injection through a porous lined tube to minimize wall loss; (2) a stem type virtual impactor to separate coarse from fine particles; (3) a filter tape collector; and (4) a beta gauge total mass detector. A stem type virtual impactor separates at ambient gas stream conditions the coarse particles from the sampling stream so that at filtration no condensible vapors, fine particles or reactive gases pass through the filter tape. This system provides coarse particle mass flux data with a time resolution of 30 seconds or better. Sampling requirements for high temperature, high pressure aerosols are defined and discussed. DOE

N82-15605# Data Resources, Inc., Lexington, Mass.

REGIONAL LOAD-CURVE MODELS: SCENARIO AND FORECAST USING THE DRI MODEL Final Report

H. D. Platt Aug. 1981 283 p Sponsored by Electric Power Research Inst.

(EPRI Proj. 1008)

(DE81-904192; EPRI-EA-1672-Vol-3) Avail: NTIS HC A13/MF A01

Regional load curve models were constructed for 32 regions that were created by aggregating hourly load data from 146 electric utilities. The forecast scenario is described and the forecast resulting from the use of this scenario is presented. The highlights of this forecast are two observations: first, peak demands will once again become winter phenomena. In the heating season, the model is reponsive to the number of heating degree hours, the penetration rate of electric heating equipment, and the rate at which this space conditioning equipment is utilized. Winter season demands grow more rapidly than demands in other seasons and peaks begin to appear in winter months. Secondly load factors begin to increase in the forecast, reversing the trend which began in the early 1960s. Nationally, load factors do not leap upwards, instead they increase gradually. DOE

N82-15606# Brookhaven National Lab., Upton, N. Y. National Center for Analysis of Energy Systems.

ASSESSMENT METHODOLOGY FOR THE AIR QUALITY IMPACT OF RESIDENTIAL WOOD BURNING

Frederick W. Lipfert 1981 20 p refs Presented at the Intern. Conf. on Residential Solid Fuels, Portland, Oreg., 1 Jun. 1981

(Contract DE-AC02-76CH-00016)

(DE81-029373; BNL-29763; CONF-810674-4) Avail: NTIS HC A02/MF A01

Firewood usage varies inversely with population density, resulting in an implied limit to the density of usage. Tests of wood stoves indicate that emissions of particulates vary inversely with heat demand, such that nighttime emissions at low combustion rates may be worse than those during maximum heat demand conditions. Finally, atmospheric dispersion rates are coupled to the driving forces of space heating so that nighttime emissions tend to have a disproportionately large impact on ambient air quality. The air quality impacts of increased residential wood fuel used were assessed. It is indicated that in flat terrain primary ambient standards are not threatened by residential wood combustion. DOE

N82-15607# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.

KINETICS OF REACTIONS IN A WET FLUE GAS SIMULTANEOUS DESULFURIZATION AND DENITRIFICATION SYSTEM

S. G. Chang, D. Littlejohn, and N. H. Lin Jul. 1981 36 p refs Presented at the ACS Symp. on Advan. in Flue Gas Desulfurization, Atlanta, 30 Mar. - 3 Apr. 1981

(Contract W-7405-eng-48)

(DE81-029853; LBL-13063; CONF-810394-1) Avail: NTIS HC A03/MF A01

A number of processes for simultaneous removal of SO2 and NO sub x are discussed. They are based on either the oxidation of relatively insoluble NO to more soluble NO2 or the employment of a water soluble ferrous chelating compound as a catalyst to aid in the absorption of the insoluble NO. These ferrous compounds have the ability to form complexes with the NO and thus promote the absorption of the NO. Once in solution NO sub x can be reduced by the absorbed SO2 to form molecular N2, N2O or reduced nitrogen compounds such as NOH(SO3)2(-2), NH(SO3)2(-2), NH2SO(-) and NH4(+); while SO2 is oxidized to sulfate. The kinetics and mechanisms of reactions involved in this system are discussed. DOE

N82-15608# University of Western Michigan, Kalamazoo. Dept. of Chemistry.

FUNDAMENTALS OF NITRIC OXIDE FORMATION IN FOSSIL-FUEL COMBUSTION Progress Report, 29 Sep. - 28 Dec. 1980

Thomas Houser and Michael E. McCarville Aug. 1981 19 p refs

(Contracts DE-AC21-76ET-10592; EX-76-C-01-2018)

(DE81-030329; DOE/ET-10593/T2; FE-2018-19) Avail: NTIS HC A02/MF A01

The rate and products of oxidation of HCN and the influence of additives, benzene, cyclohexane, toluene, acetylene and CO, on the rate and products were studied. The only significant oxidation products in the absence of additives were CO2, H2O and N2. The complex order indicates that a complex chain mechanism is operating, however, the activation energy appears too large for a chain or surface mechanism. HCN consumption dropped drastically and benzene consumption was reduced a small amount even at higher oxygen concentrations in the reactor. No change in products was observed. It suggested that CO and acetylene produce an intermediate during oxidation that does not form when benzene oxidizes. DOE

N82-15609# Brookhaven National Lab., Upton, N. Y. Dept. of Energy and Environment.

REAL TIME COARSE PARTICLE MASS MEASUREMENTS IN A HIGH TEMPERATURE AND PRESSURE COAL GASIFIER PROCESS TREATMENT

J. Wegrzyn, J. Saunders, and W. Marlow Mar. 1981 9 p refs Presented at the 3rd Symp. on the Transfer and Utilization of Particulate Control Technol., Denver, 10-12 Mar. 1981

(Contract DE-AC02-76CH-00016)

(DE81-030036; BNL-22952; CONF-810319-3) Avail: NTIS HC A02/MF A01

A probe appropriate for direct extracted sampling of erosive range particulate matter from a coal gasifier outlet or a high pressure fluidized bed combustor. The system consists of four modules: (1) a null balance extraction probe with injection through a porous lined tube to minimize wall loss; (2) a stem type virtual impactor to separate coarse from fine particles; (3) a filter tape collector; and (4) a beta gauge total mass detector. A stem type virtual impactor separates at ambient gas stream conditions the coarse particles from the sampling stream so that at upon filtration no condensible vapors, fine particles or reactive gases pass through the filter tape. DOE

N82-15610# California Univ., Livermore. Lawrence Livermore Lab. Environmental Sciences Div.

ELEMENTAL COMPOSITION OF ATMOSPHERIC FINE-PARTICLES EMITTED FROM COAL BURNED IN A MODERN ELECTRIC POWER PLANT EQUIPPED WITH A FLUE-GAS DESULFURIZATION SYSTEM

J. M. Ondov Jul. 1981 19 p refs Presented at the Am. Chem. Soc. Meeting., Las Vegas, Nev., 1 Dec. 1980

(Contract W-7405-eng-48)

(DE81-030073; UCRL-85035; CONF-801266) Avail: NTIS HC A02/MF A01

Mechanisms of fine particle formation and chemical enrichment in the flue-gas desulfurization system are dicussed. Improved control devices drastically affect the quantity, chemical composition, and physical characteristics of fine particles emitted to the atmosphere from these sources. Fly ash aerosols were sampled upstream and downstream from a modern lime slurry, spray tower system installed on a 430 Mw(e) coal utility boiler. The concentrations of up to 35 elements and estimates of the size distributions of particles in each the fly ash fractions were determined by instrumental neutron activation analysis and by electron microscopy. DOE

N82-15611# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.

INDOOR AIR QUALITY

C. D. Hollowell Jun. 1981 13 p refs Presented at the Inst. of Gas Res. Conf., Los Angeles, 28 Sep. - 1 Oct. 1981

(Contract W-7405-eng-48)

(DE81-029857; LBL-12887; CONF-810909-4; EEB-Vent-81-17) Avail: NTIS HC A02/MF A01

Common sources of indoor air pollution in buildings, the specific pollutants emitted by each source, the potential health effects, and possible control techniques are discussed. Rising energy prices, have generated an incentive to reduce ventilation rates and thereby reduce the cost of heating and cooling buildings. Reduced ventilation in buildings increases exposure to indoor air pollution. It is suggested that reduced ventilation adversely affects indoor air quality unless appropriate control strategies are undertaken. The strategies used to control indoor air pollution depend on the specific pollutant or class of pollutants encountered, and differ depending on whether the application is to an existing building or a new building under design and construction. The first course of action is prevention or reduction of pollutant emissions at the source. DOE

N82-15612# Department of Energy, Washington, D. C. Office of Conservation and Renewable Energy.

WORKSHOP ON INDOOR AIR QUALITY RESEARCH NEEDS

1980 350 p refs Proceedings of Conf. in Leesburg, Va., 3-5 Dec. 1980

(DE81-026488; CONF-801259; EPA-600/7-81-118) Avail: NTIS HC A15/MF A01

Indoor air quality research needs including the monitoring of indoor air quality, report of the instrumentation subgroup of indoor air quality, health effects, and the report of the control technology session are reported. Risk analysis studies addressing indoor environments are summarized. DOE

N82-15613# Pacific Northwest Lab., Richland, Wash.

ASSESSMENT OF THE LONG-RANGE TRANSPORT OF RESIDENTIAL WOODSTOVE FINE-PARTICULATE EMISSIONS FOR TWO FUTURE UNITED STATES ENERGY SCENARIOS

K. J. Allwine, Jr. May 1981 17 p refs Presented at the Intern. Conf. on Residential Solid Fuels, Portland, Oreg., 1-4 Jun. 1981

(Contract DE-AC06-76RL-01830)

(DE81-030096; PNL-SA-9606; CONF-810674-5) Avail: NTIS HC A02/MF A01

The impact of solar energy technologies (especially woodstoves) on regional scale fine particulate air quality resulting from direct-energy-use sources was analyzed. It is shown that significant interregional transport of fine particulates occurs especially into the three northeastern regions of the US. It is indicated that concentrations are low relative to any current particulate standards. Both maximums occurred in the Middle Atlantic region. It is predicted that the concentrations in the eastern five regions will decrease from 1975 to 2000 (both scenarios) whereas the opposite is true for the five western regions. The contributions from woodstoves are projected to increase in all regions. The majority of this increase is due to woodstoves. For the three northeastern regions more than 50% of the impact of each region is from outside the respective region. DOE

N82-15614# Battelle Pacific Northwest Labs., Richland, Wash.

TECHNIQUE FOR PLANNING AND MANAGING INDUSTRIAL GROWTH FROM THE AIR-QUALITY STANDPOINT

K. Jerry Allwine 23 Mar. 1981 10 p ref Presented at the Spring Point Source Modeling and Ambient Air Quality Monitoring Speciality Meeting, Renton, Wash., 2 Apr. 1981

(Contract DE-AC06-76RL-01830)

(DE81-028342; PNL-SA-9419; CONF-810393-1) Avail: NTIS HC A02/MF A01

A technique was developed for summing modeled air quality impacts from many sources onto a common grid. The computed concentration fields can come from any air quality model provided the same period of meteorology is used. At present the computed concentration fields from EPA models CRSTER and ISC can be overlayed onto the grid. The current area of application is for a 100 km by 100 km area but could be expanded to any management unit. Current application of the technique and potential uses in planning and managing industrial growth are discussed. T.M.

N82-15615# Steinmueller (L. und C.) G.m.b.H., Gummersbach (West Germany). Versuchsanstalt fuer Verfahrenstechnik.

INVESTIGATIONS IN A LABORATORY PLANT FOR REHEATING SCRUBBED FLUE GASES BY MEANS OF HEAT EXCHANGERS Final Report, Oct. 1980

Mohammad Yoqub Chughtai Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 96 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-005; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West

Germany DM 20

Reheating used to reduce SO2 emission from coal or oil fired power plants is discussed. Tube and plate heat exchangers were tested under scrubbed clean gas conditions. Extensive removal of the droplets contained in the clean gas, evaporation by means of recirculation, and cleaning of the heat exchanger with steam are adequate in avoiding or removing scale, either individually or combined. Laboratory as well as power plant investigations of flue gas show that Inconel 625 test specimens have the highest corrosion resistance as compared with other coated and noncoated materials. Author (ESA)

N82-15616# Research Triangle Inst., Research Triangle Park, N. C.

PROCEEDINGS: SYMPOSIUM ON IRON AND STEEL POLLUTION ABATEMENT TECHNOLOGY FOR 1980

Franklin A. Ayer, comp. Mar. 1981 628 p refs 2nd Symp. held at Philadelphia, 18-20 Nov. 1980

(Contract EPA-68-02-3152)

(PB81-244808; EPA-600/9-81-017; IERL-RTP-1161) Avail: NTIS HC A99/MF A01 CSCL 13B

Information on technology problems related to air, water, and solid waste pollution control in the iron and steel industry, environmental aspects of a proposed formcoke demonstration plant and the future of steel technology and the environment were exchanged. The following topics were examined: (1) air pollution abatement, covering coke plant emission control, fugitive emission control, innovative air pollution control technology, iron and steelmaking emission control, and inhalable particulates; (2) water pollution abatement, covering recycle/reuse of water, coke plant wastewater treatment, and coke plant wastewater new developments; and (3) solid waste pollution abatement. GRA

N82-15617# Michigan Univ., Ann Arbor. Dept. of Atmospheric and Oceanic Science.

ENVIRONMENTAL CONTROLS ON THE COMPOSITION OF THE SURFACE MICROLAYER IN LAKE MICHIGAN

James E. Mackin, Robert M. Owen, and Philip A. Meyers Sep. 1980 48 p refs

(PB81-239006; UMICH-SG-80-203; ; NOAA-81062915) Avail: NTIS HC A03/MF A01 CSCL 08G

Surface microlayer and subsurface (1 m) water samples were collected at ten stations along the major axis of Lake Michigan and in the ten major rivers which flow into the lake to determine the processes which influence the composition of the surface microlayer. Dissolved and particulate phase concentrations of the elements Ca, Cu, Fe, K and Mn were determined. Associations revealed by these analyses indicate that the composition of fluvial microlayers is controlled by localized factors, related to the geology of individual drainage basins, while open lake microlayers are influenced by broad scale physio-chemical interactions. Author

N82-15618# Battelle Columbus Labs., Ohio.

USE OF COAL CLEANING FOR COMPLIANCE WITH SO2 EMISSION REGULATIONS Final Report, Jun. 1977 - Jun. 1981

E. H. Hall, A. W. Lemmon, Jr., G. L. Robinson, F. K. Goodman, J. H. McCreery, R. E. Thomas, and P. A. Smith Sep. 1981 438 p refs

(Contract EPA-68-02-2163)

(PB81-247520; EPA-600/7-81-146; IERL-RTP-1244) Avail: NTIS HC A19/MF A01 CSCL 13B

Results of an evaluation of coal cleaning as a means of controlling SO2 emissions from coal fired stationary sources are presented. Coal cleaning was examined in the light of various existing and proposed SO2 emissions regulations to determine applications in which the technology would be most useful. Barriers were identified that prevent wider application of coal cleaning. Actions are described which should be taken to overcome these barriers. Much information about coal is compiled as resource data on the coal reserve base, present and projected coal production, coal cleanability, current and projected coal use by utilities and industry, size and age distribution of coal fired facilities, and the nature of coal contracts. Environmental impacts of coal cleaning are compared with those of other sulfur removal strategies such as flue gas desulfurization and the use of low sulfur coal. Similarly, costs of the various SO2 control alternatives are compared. GRA

N82-15619# Little (Arthur D.), Inc., Cambridge, Mass.

MONITORING TECHNIQUES FOR CARBON FIBER EMISSIONS: EVALUATION B Final Report

Edward T. Peters, Kenneth T. Menzies, Edward J. Cook, and Michael Rossetti Aug. 1981 81 p refs

(Contract EPA-68-02-3275)

(PB81-247413; EPA-600/2-81-145) Avail: NTIS HC A05/MF A01 CSCL 13B

An evaluation of available measurement methods for continuously monitoring the number and mass of carbon fibers emitted from source operations was conducted. A total of eleven candidate monitoring methods were identified based on contact (electrical), locally sensing (optical, microwave) and remote sensing (microwave, radar). Each method was rated on the basis of measurement (sampling), detection and instrumental parameters, and their useful concentration and length range were compared to three emission scenarios representing textile weaving machining and waste incineration. Five methods have merit for certain conditions and are recommended for further study. GRA

N82-15620# Environmental Protection Agency, Ann Arbor, Mich. Office of Mobile Source Air Pollution Control.

AIR QUALITY ANALYSIS FOR THE 1984 HIGH ALTITUDE REPORT TO CONGRESS: SUMMARY OF RESULTS

Mark Wolcott Apr. 1981 71 p refs

(PB81-247702; EPA-AA-TEB-81-17) Avail: NTIS HC A04/MF A01 CSCL 13B

Four types of control strategies were considered. These strategies are examined first without an inspection and maintenance program for light duty vehicles alone and in combination with similar trucks. Next, these strategies are assumed to include an inspection and maintenance program. Changes in each of the three major mobile source pollutants, carbon monoxide, nonmethane hydrocarbons, and oxides of nitrogen, are examined for their ambient air quality effects in Denver, Colorado Springs, Albuquerque, and Salt Lake City. Other factors include the modified linear rollback model, the National Emission Data System, a source contribution factor, design values, background pollution, stationary sources, growth and retirement rates, emission rations, and air quality projections. GRA

N82-15621# Environmental Protection Agency, Ann Arbor, Mich. Standards Development and Support Branch.

HEAVY-DUTY ENGINE BASELINE PROGRAM AND NO SUB X EMISSION STANDARD DEVELOPMENT (1972-73)

Timothy Cox, Zachary Diatchun, Thomas Nugent, Glenn Passavant, and Larry Ragsdale Mar. 1981 69 p refs

(PB81-244030; EPA-AA-SDSB-81-01) Avail: NTIS HC A04/MF A01 CSCL 13B

The statutory NOx emission standard for 1985 heavy duty engines was determined. The standard is based on a 75% reduction from the average measured emissions for uncontrolled (1972-73 model year) gasoline fueled heavy duty engines program established the amount of NOx emissions from the uncontrolled heavy duty gasoline-fueled engines. A baseline testing this program consists of four sectons: (1) engine procurement; (2) restorative maintenance; (3) testing the engine emission levels by transient test procedure; and (4) determination of the average measured emissions. GRA

N82-15622# Research Triangle Inst., Research Triangle Park, N. C.

PROCEEDINGS OF THE CONFERENCE ON WOOD COMBUSTION ENVIRONMENTAL ASSESSMENT Progress Report, Oct. 1980 - Jun. 1981

Franklin A. Ayer, comp. 1981 330 p refs Proceedings of conf. held at New Orleans, 21-24 Feb. 1981

(Contract EPA-68-02-3170)

(PB81-248155; EPA-600/9-81-029; IERL-RTP-1235) Avail: NTIS HC A15/MF A01 CSCL 13B

Residential wood combustion information is presented. An overview of environmental assessment activities, specific emissions and heating efficiency assessments, emissions control techniques and residential wood combustion issues and their resolution are discussed. High concentrations of polycyclic organic

matter (POM) in residential wood stove emissions were verified. High POM concentrations in the indoor environment of homes with wood stoves were reported. High ambiemt values were not attributed to residential wood combustion. Emission control techniques which were considered for controlling organic emissions included secondary combustion and the introduction of a combustion catalyst. GRA

N82-15623# Research Triangle Inst., Research Triangle Park, N. C.
SYMPOSIUM PROCEEDINGS: ENVIRONMENTAL ASPECTS OF FUEL CONVERSION TECHNOLOGY, 5TH Progress Report, Feb. - Aug. 1980
F. A. Ayer, comp. and N. S. Jones, comp. Jan. 1981 665 p refs Proceedings of symp. held in St. Louis, 16-19 Sep. 1980 (Contract EPA-68-02-3170)
(PB81-245045; EPA-600/9-81-006) Avail: NTIS HC A99/MF A01 CSCL 13B

Environmental aspects of fuel conversion technology are presented. Environmental information related to coal gasification, indirect liquefaction, direct liquefaction, program approach, environmental assessment, environmental control, and the development of pollution control guidance documents is included. GRA

N82-15624# Geological Survey, Indianapolis, Ind. Water Resources Div.
EFFECTS OF COAL FLY-ASH DISPOSAL ON WATER QUALITY IN AND AROUND THE INDIANA DUNES NATIONAL LAKESHORE, INDIANA Final Water-resources Investigation Report
Mark A. Hardy Apr. 1981 73 p refs
(PB81-238479; USGS/WRD/WRI-81-073; USGS/WRI-81-16) Avail: NTIS HC A04/MF A01 CSCL 13B

Dissolved constituents in seepage from fly ash settling ponds bordering part increased trace elements, and gross alpha and gross beta radioactivity in ground water and surface water downgradient from the settling ponds. It is suggested that concentrations of some dissolved trace element are greater beneath interdunal pond 2 than in the pond. It is found that calcium concentrations are greater in ground water downgradient from the settling ponds than in the ponds. Where organic material is present downgradient from the settling ponds, concentrations of arsenic, fluoride, molybdenum, potassium, sulfate, and strontium were greater in the ground water than in the ponds. In contrast, the concentrations of cadmium, cooper, nickel, aluminum, cobalt, lead, and zinc are less. GRA

N82-15625# PEDCo-Environmental, Inc., Cincinnati, Ohio.
EVALUATION OF SOLVENT LOSS FROM VAPOR DEGREASER SYSTEMS. PHASE 2 AND 3: EFFECT OF CROSSCURRENT AIR VELOCITY ON CONTROL SYSTEM PERFORMANCE Final Report, Jul. 1970 - Nov. 1980
R. W. Gerstle and E. S. Schindler May 1981 99 p
(Contracts EPA-68-02-2535; EPA-68-02-2907)
(PB81-246308; EPA-600/2-81-072; PN-3280-C; PN-3481-1) Avail: NTIS HC A05/MF A01 CSCL 13B

Pollution reduction capabilities of vapor degreasers fitted with add-on control systems were evaluated. Solvent loss from degreasing systems of various design was assessed, and the test conditions, procedures, results, and conclusions are reported. Tests were performed to evaluate the effects of different variables on the rate of solvent loss from degreasers. The variables tested include the following degreaser control options and operating conditions: freeboard ratio, load cross sectional area, refrigerated freeboard chiller, hoist speed, lip exhaust, crosscurrent air velocity, degreaser size, solvent type, an automatic cover. The factor most likely to ensure long periods of operation with minimum solvent loss, regardless of the mix of control options are ensured by installation in an area where crosscurrent velocity is minimized. GRA

N82-15626# TRW, Inc., Research Triangle Park, N.C. Progress Center.
DEMONSTRATION OF WELLMAN-LORD/ALLIED CHEMICAL FGD TECHNOLOGY: DEMONTRATION TEST SECOND YEAR RESULTS Final Report, Feb. 1973 - Oct. 1979
R. C. Adams, S. W. Mulligan, and R. R. Swanson Aug. 1981 410 p refs
(Contract EPA-68-02-3174)
(PB81-246316; EPA-600/7-81-140) Avail: NTIS HC A18/MF A01 CSCL 13B

The performance over a 2 year period of a full scale flue gas desulfurization (FGD) is reported. The process is regenerable, employing sodium sulfite wet scrubbing, thermal regeneration of the spent scrubber solution, and reduction to elemental sulfur of the recovered SO2. Process energy requirements, primarily for thermal regeneration of the scrubber solution and subsequent recovery of SO2, were quite large, amounting to 12 percent of the boiler heat input derived from fuel. Operation and performance occurred after some modification to the boiler to increase inlet flue gas temperature and after implementing FGD plant improvements identified during initial operation. GRA

N82-15627# National Enforcement Investigations Center, Denver, Colo.
THE USE OF LIDAR FOR EMISSIONS SOURCE OPACITY DETERMINATIONS: SECOND EDITION
Arthur W. Dybdahl Jul. 1981 399 p refs Sponsored by EPA
(PB81-246662; EPA-330/1-79-003-R) Avail: NTIS HC A17/MF A01 CSCL 13B

Lidar can be used to measure the opacity of particulate emissions from stationary sources. Extensive test results support the promulgation of the lidar technique as an alternative to trained visible emissions observers (VEO). Three tests demonstrate lidar precision and accuracy: one using an aerosol chamber to generate a controlled particulate plume, the second using an optical generator to simulate lidar return signals, the third using fabricated screen targets of constant fixed opacity. Advantages of lidar over VEOs are the ability to measure opacity during darkness and independently of background contrast conditions, and also the lidar is not subject to time and endurance constraints. Requirements and procedures needed to facilitate routine use of lidar were developed. GRA

N82-15628# National Water Well Association, Worthington, Ohio.
DISEQUILIBRIUM OF HYDROGEN SULFIDE IN GROUND WATER BY AERATION Final Report
Joseph Dwight Ritchey 24 Apr. 1981 119 p refs
(Grant NSF ISP-80-15077)
(PB81-244717; NSF/ISP-81011) Avail: NTIS HC A06/MF A01 CSCL 13B

Removal of hydrogen sulfide gas by aeration as a result of bubbling air through water in the well before it is pumped out of the ground was examined. Evaluation of water analyses indicated three processes that caused reduction in the concentration of hydrogen sulfide gas: (1) hydrogen sulfide gas was released from water to air by gas transfer indicated by a strong 'rotten egg odor', characteristic of hydrogen sulfide gas that was emitted from the wellhead; (2) hydrogen sulfide gas was oxidized to elemental sulfur evidenced by an increase in dissolved oxygen measured in water samples and by clouding of pumped water; and (3) hydrogen sulfide gas was partially ionized indicated by an increase in the pH and the redox potential of water samples. This field study demonstrates that in-well areation is an effective method of hydrogen sulfide gas removal in domestic wells with potential application in larger installations. GRA

N82-15629# NATO Committee on the Challenges of Modern Society, Brussels (Belgium).
AIR POLLUTION PILOT STUDY: ASSESSMENT METHODOLOGY AND MODELING, 1975 - 1979 (FIRST FOLLOW-UP REPORT)
31 Aug. 1980 139 p refs
(PB81-242257; NATO/CCMS-114) Avail: NTIS HC A07/MF A01 CSCL 13B

The recommendations made by the air pollution pilot study assessment methodology and modeling (1975-1978) for the Federal Republic of Germany are reported. Exchange of information on application of the air quality management systems (AQMS) methods and techniques as described in the technical documents of the study are reviewed. GRA

N82-15630# NATO Committee on the Challenges of Modern Society, Brussels (Belgium).
PRACTICAL DEMONSTRATION OF URBAN AIR QUALITY SIMULATION MODELS. PART 1: A REPORT OF THE NATO/CCMS PILOT STUDY ON AIR POLLUTION ASSESSMENT METHODOLOGY AND MODELING
Aug. 1980 114 p refs
(PB81-242240; NATO/CCMS-106-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 13B

Cooperation of NATO member nations in developing standardized methods for emissions data storage and retrieval to support requirements in conduct of national air quality management programs are reported. Cooperation in developing standardized techniques for projecting emissions and predicting future ambient air quality is discussed. GRA

N82-15631# NATO Committee on the Challenges of Modern Society, Brussels (Belgium).
AIR POLLUTION EMISSIONS INVENTORY SYSTEMS. APPENDIX C: EMISSIONS INVENTORY IN THE FEDERAL REPUBLIC OF GERMANY
Aug. 1980 175 p refs
(PB81-242232; NATO/CCMS-104-App-C) Avail: NTIS HC A08/MF A01 CSCL 13B

Emissions inventory systems and methods used in the Federal Republic of Germany are reviewed. GRA

N82-15632# New York Sea Grant Inst., Albany.
GREAT LAKES COASTAL GEOLOGY. EFFECTS OF JETTIES, SODUS BAY, NEW YORK
William R. Brownlie (Calif. Inst. of Tech., Pasadena) and Parker E. Calkin (State Univ. of New York, Buffalo) Jan. 1981 30 p refs Sponsored by NOAA
(PB81-238982; NOAA-81062917) Avail: NTIS HC A03/MF A01 CSCL 08M

Erosion of the Lake Ontario coastline around Great Sodus Bay (near Rochester, N.Y.), may be due to a federal navigation project which involved construction of piers and breakwaters and dredging the channel at the entrance to Sodus Bay. Possible links between coastline erosion and jetties are studied. GRA

N82-15633# Los Angeles County Sanitation District, Whittier, Calif.
PARALLEL EVALUATION OF AIR-AND OXYGEN-ACTIVATED SLUDGE Final Report, Feb. 1975 - Dec. 1976
Scott Austin, Fred Yunt, Donald Wuerdeman, and Walter E. Garrison Aug. 1981 53 p
(Contract DI-14-12-150)
(PB81-246712; EPA-600/2-81-155) Avail: NTIS HC A04/MF A01 CSCL 13B

The merits of air and oxygen in the activated sludge process, two 1900-cu m/day activated sludge pilot plant, one air and one oxygen system, were operated. Both of the pilot plants met the applicable discharge limitations for everything but three trace metals, but the oxygen system provided a more stable operation. Primary differences in performance concerned ammonia nitrogen removals and energy consumption. GRA

N82-15634# Wyle Labs., Inc., El Segundo, Calif.
MANUAL FOR DEVELOPMENT OF FORMAT FOR THE PRESENTATION OF COMMUNITY NOISE ASSESSMENT DATA
Marilyn Auerbach and Katharina R. Geissler Jul. 1981 105 p refs
(Contract EPA-68-01-4909)
(PB81-243008) Avail: NTIS HC A06/MF A01 CSCL 13B

A comprehensive and computerized system assesses the noise problems of a community and then planning a noise control strategy for its abatement. A guide to various presentation techniques for all the data generated by the Community Noise Assessment Manual is presented which will facilitate. GRA

N82-15635# Wyle Labs., Inc., El Segundo, Calif.
COMMUNITY NOISE ASSESSMENT MANUAL: SOCIAL SURVEY WORKBOOK
Jul. 1981 566 p Prepared in cooperation with California Univ., Los Angeles
(Contract EPA-68-01-4694)
(PB81-244360) Avail: NTIS HC A24/MF A01 CSCL 13B

Workbook for the design and administration of a social survey of community attitudes toward noise is presented. Instructions for survey design and management and appendices providing forms and special handbooks for administering the survey is reviewed. The major areas are: an attitudinal questionnaire, sample selection procedures, data processing procedures and techniques for data analysis. GRA

N82-15636# Monsanto Research Corp., Dayton, Ohio.
ENGINEERING HANDBOOK FOR HAZARDOUS WASTE INCINERATION Final Report, Mar. - Sep. 1981
T. A. Bonner, C. L. Cornett, B. O. Desai, J. M. Fullenkamp, T. W. Hughes, M. I. Johnson, E. D. Kennedy, R. J. McCormick, J. A. Peters, and D. L. Zanders Sep. 1981 487 p refs
(Contract EPA-68-03-3025)
(PB81-248163; MRC-DA-1090; EPA/SW-889) Avail: NTIS HC A21/MF A01 CSCL 13B

Technical advisory information on hazardous waste incineration is presented. Generic incineration processes involving gaseous and solid wastes are reviewed. Foreign and domestic incinerator technology is discussed along with air pollution control devices. Waste sampling and analysis methods are given as well as techniques for evaluating incineration and air pollution control systems designs. Overall facility design, operation, and monitoring is discussed. GRA

N82-15637# Energy Resources Co., Inc., Cambridge, Mass.
POTENTIAL ENVIRONMENTAL PROBLEMS OF ENHANCED OIL AND GAS RECOVERY TECHNIQUES Final Report
Ron Beck, Robert Shore, Terry Ann Scriven, and Melinda Lindquist Aug. 1981 297 p refs
(Contract EPA-68-03-2648)
(PB81-240186; EPA-600/2-81-149) Avail: NTIS HC A13/MF A01 CSCL 13B

This report provides: (a) an identification of and analysis of available data regarding EOR/EGR related pollutants; (b) an assessment of potential environmental impacts and an identification of possible controls; and (c) recommendations as to research needs. The following processes were studied: steam injection, in situ combustion, carbon dioxide miscible flooding, micellar/polymer flooding, alkaline flooding, improved waterflooding, advanced hydraulic fracturing, chemical explosive fracturing, and directional drilling. The existing EOR/EGR environmental impact information (published and unpublished) is critically reviewed and summarized. The effect of EOR/EGR processes on air quality, groundwater quality, water quantity, noise levels, and secondary impacts is the main area of analysis. GRA

N82-15638# Environmental Protection Agency, Ann Arbor, Mich. Test and Evaluation Branch.
COMPILATION OF AIR POLLUTANT EMISSION FACTORS: HIGHWAY MOBILE SOURCES Final Report
Mar. 1981 408 p
(PB81-238305; EPA-460/3-81-005) Avail: NTIS HC A18/MF A01 CSCL 13B

The emission factors and calculation methodology is used in the MOBILE2 computer program are summarized. The emission factors are presented for eight individual vehicle types in three regions of the country. This document describes the basic test procedures used to collect the hydrocarbon (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) emissions and the generalized emission factors calculation equations. The emissions presented in this document are the basic exhaust emissions, the crankcase and evaporate HC emissions, January 1 basic exhaust emission levels, and idle exhaust emissions. Further, nonmethane HC fractions and particulates are presented to adjust the emissions for various ambient and vehicle usage conditions such as speed, temperature, and humidity for NOx. GRA

N82-15639# Engineering-Science, Inc., McLean, Va.
REVIEW AND UPDATE OF MODELING ANALYSIS OF CARBON MONOXIDE EMISSIONS IN MECKLENBURG COUNTY, NORTH CAROLINA Final Report
Jul. 1981 115 p
(Contract EPA-68-02-3509)
(PB81-248841; EPA-904/9-81-080) Avail: NTIS HC A06/MF A01 CSCL 13B

The carbon monoxide emissions were analyzed by state-of-

the-art modeling techniques. The techniques were used to forecast ambient CO concentrations at three existing monitoring sites as well as at other anticipated hotspots where high concentrations might occur. Locations where ambient violations may occur at the end of 1987 are indicated. The results will be used to compile a control plan for the scheduled state implementation plan revision in 1982 which will show these hotspots in compliance with the ambient standard by the end of 1987.GRA

N82-15640# Delamer, Inc., Cupertino, Calif.
RESEARCH OUTLOOK, 1981 Annual Report
Elissa Feldman, ed. Dec. 1980 195 p
(Contract EPA-68-02-3644)
(PB81-243495; EPA-600/9-80-061) Avail: NTIS
HC A09/MF A01 CSCL 13B

Research Outlook 1981 is the sixth in a series of EPA annual reports mandated by Congress. It describes the research currently performed and the program that is expected to be implemented over the next five years. Topics include environmental research and planning, air pollution, nonionizing radiation, pesticides, water quality and waste water. The structure of the EPA Office of Research and Development is described. The priorities for research center around finding cost effective ways of controlling and monitoring toxic hazards are included. GRA

N82-15641# Wyle Labs., Inc., El Segundo, Calif.
COMMUNITY NOISE ASSESSMENT MANUAL: COMPUTER PROGRAMS FOR THE STRATEGY GUIDELINES FOR DEVELOPING A COMMUNITY NOISE CONTROL PROGRAM
Patrick K. Glenn Jul. 1981 263 p 2 Vol.
(Contract EPA-68-01-3921)
(PB81-243024) Avail: NTIS HC A12/MF A01 CSCL 13B

Computer programs required for running a community noise control program are given. The programs were written for a UNIVAC 1108. The source language used is FORTRAN 4. A listing of the source programs are included. GRA

N82-15642# Wyle Labs., Inc., El Segundo, Calif.
COMMUNITY NOISE ASSESSMENT MANUAL: STRATEGY GUIDELINES FOR DEVELOPING A COMMUNITY NOISE CONTROL PROGRAM
Jul. 1981 232 p 2 Vol.
(Contract EPA-68-01-3921)
(PB81-244352) Avail: NTIS HC A11/MF A01 CSCL 13B

Communities are assisted in determining, in an objective manner, the efficient application of funds for reducing the adverse effects of noise in their community. Since the number of possible combinations of noise sources and corresponding countermeasures to reduce their impact can be quite large, a computer based approach is therefore used to develop optimum scenarios for noise control expenditures. This manual utilizes an optimization computer model, which selects the most cost effective noise abatement measures and the amount of money which should be spent on each. The primary criterion for optimization is based on economic and acoustical data gathered in the community. GRA

N82-15643# Environmental Protection Agency, Seattle, Wash. Analytic Center.
QUANTIFYING ENVIRONMENTAL IMPACTS
C. A. Shenk and William Riley May 1981 46 p refs
(PB81-244915; EPA-910/9-81-086) Avail: NTIS
HC A03/MF A01 CSCL 13B

The inclusion of environmental impacts in cost effectieness determinations is examined. Methodologies and research used for quantifying those impacts were reported. A methodology to assess the cost effectiveness of proposed electric power projects was developed. Difficulties in physically measuring environmental impacts and in subsequently placing dollar values on them are discussed. Impact mitigation costs and expert judgement techniques are reviewed to determine the appropriateness for this process. Property structuring of the decision making process to avoid the need for comparing completely unlike alternatives is suggested. GRA

N82-15644# Mason and Hanger-Silas Mason Co., Inc., Leonardo, N. J.
PERFORMANCE TESTING OF THE SOVIET OIL/DEBRIS SKIMMER Final Report
H. W. Lichte Aug. 1981 42 p
(Contract EPA-68-03-2642)
(PB81-244790; EPA-600/2-81-154) Avail: NTIS
HC A03/MF A01 CSCL 13B

Performance evaluation of a Soviet oil skimmer was conducted. The oil skimming capability of a specially modified Soviet skimmer, Model 2550/4 was valuated. The vessel is capable of five knots forward speed and skims effectively at speeds from zero to two knots. It is suggested that the unique combination of various weir designs into one system, vessel mobility, the efficient use of energy, a series type oil/water gravity separator, and the propulsion techniques makes it an effective harbor skimmer. GRA

N82-15645# State Univ. of New York Coll. of Environmental Science and Forestry, Syracuse.
UTILIZATION OF EARTHWORMS AND MICROORGANISMS IN STABILIZATION, DECONTAMINATION AND DETOXIFICATION OF RESIDUAL SLUDGES FROM TREATMENT OF WASTEWATER Final Report
Roy Hartenstein 16 Feb. 1981 19 p
(Grant NSF PFR-78-09331)
(PB81-236481; NSF/CEE-81009) Avail: NTIS
HC A02/MF A01 CSCL 13B

The feasibility of using earthworms in management of municipal sludges was examined. Results of tests on two earthworm species, Eudrilus eugeniae and Eisenia foetida, are reported. The following observations were made. (1) toxicity of worm casts to the earthworms signifies the need to retain E. foetida in its source of food (activated sludge) as long as, or slightly longer than, the time required to convert the sludge into castings; (2) knowledge of the quantity of material passing through the earthworm gut per unit of time, for a particular ingestibie sludge, permits prediction of sludge quantity manageable per unit time; and (3) E. foetida fails to gain weight rapidly, if at all, on unlimited supplies of certain organic materials. GRA

N82-15646# Environmental Protection Agency, Research Triangle Park, N.C. Quality Assurance Div.
NATIONAL PERFORMANCE AUDIT PROGRAM: 1979 PROFICIENCY SURVEYS FOR SULFUR DIOXIDE, NITROGEN DIOXIDE, CARBON MONOXIDE, SULFATE, NITRATE, LEAD AND HIGH VOLUME FLOW
Berne I. Bennett, Robert L. Lampe, and John C. Puzak Apr. 1981 64 p refs
(PB81-239402; EPA-600/4-81-025) Avail: NTIS
HC A04/MF A01 CSCL 07D

Sample material, simulating ambient air pollution samples as closely as possible, are furnished to participating laboratories. Surveys of hi-vol sample flow are conducted annually using a modified orifice. The various sample materials are monitored by the Quality Assurance Division to assure that samples are stable, of uniform composition and are representative of pollutant concentration levels encountered under field sampling conditions and that all materials conform to prescribed standards of accuracy. Sample materials are required to be similar enough to true air pollution matrices not to introduce unrealistic conditions of sample preparation or impose handling techniques that are not a part of the normal monitoring and analytical activity. A major survey objective is the assessment of routine analytical performance. GRA

N82-15647# Environmental Protection Agency, Research Triangle Park, N.C. Data Management and Analysis Div.
AIR QUALITY DATA FOR NONMETALLIC INORGANIC IONS: NITRATE AND SULFATE FOR 1977 AND 1978 FROM THE NATIONAL AIR SURVEILLANCE NETWORKS Final Report
Gary F. Evans, John C. Puzak, John E. Frazer, and Allan Riley Sep. 1981 146 p refs
(PB81-248148; EPA-600/4-81-074) Avail: NTIS
HC A07/MF A01 CSCL 13B

Concentration values are presented in the form of cumulative frequency distributions. Arithmetic and geometric sample statistics are also reported, as are measures of the precision and bias associated with the analytical methods employed. GRA

N82-15648# HydroQual, Inc., Mahwah, N.J.
ULTRAVIOLET DISINFECTION OF A SECONDARY WASTE-WATER TREATMENT PLANT EFFLUENT Progress Report, Nov. 1977 - Feb. 1980
O. Karl Scheible and Carlene D. Bassell Aug. 1981 167 p refs Prepared in cooperation with Northwest Bergen County Sewer Authority, Waldwick, N.J.
(Grant EPA-R-804880)
(PB81-242125; EPA-600/2-81-152) Avail: NTIS HC A08/MF A01 CSCL 13B

Ultraviolet disinfection of a full-scale secondary effluent was investigated during a 13 month field study. The experimental program was designed to demonstrate the feasibility of achieving a fecal coliform density of 200 MPN/100 ml by ultraviolet irradiation; to determine the efficiency of ultraviolet disinfection relative to dosage, power consumption, and effluent water quality; and to assess the utility of the full-scale unit relative to O&M requirements. The impact of photoreactivation was investigated during the field program. Uniform procedures for the calculation of dose and the sizing of ultraviolet systems were also developed. Second order dose-response relationships were developed and were found to provide a rational expression of the microbial response to ultraviolet dose. GRA

N82-15649# T. S. Associates, Inc., Columbia, Md.
LABORATORY DEMONSTRATION OF THE FEASIBILITY OF USING COMMERCIALLY-AVAILABLE, IN-DEPTH FILTERS FOR SUSPENDED SOLIDS REMOVAL BY CROSS-FLOW FILTRATION
T. R. Sundaram and Abbas M. Sinnarwalla Feb. 1981 157 p refs
(Grant NSF DAR-80-10543)
(PB81-243719; J6005-P80012-1; NSF/CPE-81005) Avail: NTIS HC A08/MF A01 CSCL 13B

Correlations of filtration performance with various relevant filter, wastewater, and operating parameters are given. Further pilot-scale confirmation of the concept demonstrated in the laboratory offers applications to a technology for suspended solids separation which is efficient, relatively inexpensive, and has low energy requirements. Experimental procedures are described and the test results and their implications are presented. Potential commercial applications are in the food-processing, metal-finishing, and laundry industries, as well as in the treatment of wastewater. T.M.

N82-15650# National Oceanic and Atmospheric Administration, Boulder, Colo. Ocean Dumping Program.
ASSESSMENT REPORT ON THE EFFECTS OF WASTE DUMPING IN 106-MILE OCEAN WASTE DISPOSAL SITE: DUMPSITE EVALUATION REPORT
May 1981 325 p refs
(PB81-241572; DER-81-1; NOAA-81070602) Avail: NTIS HC A14/MF A01 CSCL 08J

Individual investigations carried out under NOAA funding by various Federal and university scientists are summarized. Field and laboratory studies of the heavy and transition metals in the major wastes dumped at 106-Mile Site are emphasized. Field and laboratory studies of the effects of the wastes on bacteria, plankton, fish eggs, and fish are considered. T.M.

N82-15651# Research Triangle Inst., Research Triangle Park, N. C.
PROCEEDINGS: SYMPOSIUM ON FLUE GAS DESULFURIZATION, VOLUME 1
Franklin A. Ayer Apr. 1981 548 p refs Symp. held at Houston, Tex., 28-31 Oct. 1980
(Contract EPA-68-02-3170)
(PB81-243156; EPA-600/9-81-019A-Vol-1) Avail: NTIS HC A23/MF A01 CSCL 13B

Presentations of the flue gas desulfurization (FGD) conference are presented. They cover such subjects as approaches for control of acid rain, the Nation's energy future, economics of FGD, legislative/regulatory developments, FGD research/development trends, FGD system operating experience, FGD byproduct disposal/utilization, developments in dry FGD, and industrial boiler applications. GRA

N82-15652# Research Triangle Inst., Research Triangle Park, N. C.
PROCEEDINGS: SYMPOSIUM ON FLUE GAS DESULFURIZATION, VOLUME 2
Franklin A. Ayer, comp. Apr. 1981 551 p refs 6th Symp. held at Houston, Tex., 28-31 Oct. 1980
(Contract EPA-68-02-3170)
(PB81-243164; EPA-600/9-81-019B) Avail: NTIS HC A24/MF A01 CSCL 13B

Proceedings on flue gas desulfurization are documented. Presentations covered the following subjects: approaches for control of acid rain, the nation's energy future, economics of FGD, legislative/regulatory developments, FGD research/development trends, FGD system operating experience, FGD byproduct disposal/utilization, developments in dry FGD, and industrial boiler applications. GRA

N82-15729*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ENVIRONMENTAL EFFECTS OF SHUTTLE LAUNCH AND LANDING
Andrew E. Potter *In its* STS-1 Med. Rept. Dec. 1981 p 81-91
(For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 13B

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N82-15653 Atomic Weapons Research Establishment, Aldermaston (England).
COMPLEXITY OF SHORT PERIOD P SEISMOGRAMS: WHAT DOES SCATTERING CONTRIBUTE?
A. Douglas, J. A. Hudson (Cambridge Univ., England), and B. J. Barley Jul. 1981 57 p refs
(AWRE-O-3/81; BR79646) Copyright. Avail: Issuing Activity

The complexity of the P-coda is reviewed. The coda of short period P seismograms, including the precursors to PP, are waves scattered in the crust and uppermost mantle. Scattering effects are separated from those of simple reverberation in plane parallel layered models and observed seismograms and models computed using simple Earth and source models are compared. Broadband seismograms were used since they display ground displacement over a wider frequency range than SP seismograms. It is shown that although the arrivals between P and PP appear to have a wide energy spectrum, they consist mainly of scatter waves at short periods, and reflected and converted waves at long periods. Author (ESA)

N82-15654# Prins Maurits Lab. TNO, Rijswijk (Netherlands). Inst. voor Chemische en Technologische Research.
SIMPLE METHODS FOR THE CALCULATION OF THE DISPERSION OF GASES IN THE ATMOSPHERE
C. J. P. vanBuijtenen Apr. 1979 59 p refs In DUTCH; ENGLISH summary
(PML-1979-29; TDCK-72219) Avail: NTIS HC A04/MF A01

The Gaussian plume model and Pasquill's recommendations for the use of stability classes and corresponding dispersion coefficients are considered in this revised version of Report 1976-15 of the Chemical Laboratory TNO. Author

N82-15655# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 1: Physics.
TRANSMISSION AND EMISSION OF THE ATMOSPHERE; CONTINUED MEASUREMENTS AND ANALYSIS OF THE DATA
W. A. P. Denissen Nov. 1979 33 p refs In DUTCH; ENGLISH summary
(PHL-1979-50; TDCK-73427) Avail: NTIS HC A03/MF A01

Measurements are presented of the transmission and the emissions of the atmosphere in the infrared spectral region, carried out with the teleradiancemeter. Special attention is given to the measurements performed in autumn of 1978, under different

meteorological conditions. A great part of the measurements were done at low values of the visual range. The experimental accuracy is pointed out in relation to the source and ambient temperature. The measured results are compared with transmission calculations, done by means of a computer program, incorporating the LOWTRAN 3B program. M.G.

N82-15656# Geettingen Univ. (West Germany). Inst. fuer Geophysik.

GEOMAGNETIC AND MAGNETOTELLURIC SOUNDINGS IN THE AREA OF THE CENTRAL EUROPEAN RIFT SYSTEM Final Report, Jun. 1980

Michael Lee Richards, Urich Schmucker, Erich Steveling, and Juergen Waterman Bonn Bundesministerum fuer Forschung und Technologie Aug. 1981 76 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie and EEC

(BMFT-FB-T-81-111; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 16

The conductivity structure connected with the Central European rift system was investigated with regard to geothermal energy sources using methods of geomagnetic depth sounding and magnetotelluric sounding. Sensors, a data acquisition system, and a software package for data handling and data analysis were developed. During a test campaign in the Leinegraben area and two field campaigns in the Rheingraben area, geoelectric and geomagnetic variations in the period range from 6 seconds to 24 hours were registrated. At base sites in the Rheingraben and the Black Forest, models of the vertical profile of the electrical conductivity were determined, while at sites in between the lateral conductivity variations were investigated. The perturbation of magnetic field in the region of the Rheingraben is strong and frequency dependent. The higher frequencies (low penetration depths) show the influence of the graben sedimentary structure, filling only the narrow graben area, and strong currents along the center of the graben. The lower frequencies (deeper penetration depths) reflect the deeper, probably broader conductivity structure. Author

N82-15657# Max-Planck-Institut fuer Kernphysik, Heidelberg (West Germany).

THE MASS SPECTROMETER EXPERIMENT IN THE PROGRAM AEROS Final Report, Mar. 1981

Dieter Krankowsky and Peter Laemmerzahl Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 59 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-W-81-030; ISSN-0170-1339) Avail: NTIS HC A04/MF A01

The neutral and ion mass spectrometer measured the composition of gases (He, N, O, N2, and Ar) and the ion composition. The instrument, calibration, and data analysis are described. Some results as e.g., the detection of atomic nitrogen, measurement of gravity waves, and an empirical model for the seasonal variaton of gas composition are presented. Author

N82-15658# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).

DATA PROCESSING AND DATA EVALUATION OF THE ISEE-PARTICLE SPECTROMETER Final Report, Feb. 1981

Patrick W. Daly, Erhard Keppler, and Horst Specht Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 101 p refs In GERMAN; ENGLISH summary Sponsored in cooperation with Max-Planck Gesellschaft

(Contracts BMFT-01-OI-016; BMFT-ZA-WF-WRK-0275:4)

(BMFT-FB-W-81-032; ISSN-0170-1339) Avail: NTIS HC A06/MF A01

The processing and the evaluation of the data provided by our charged particles spectrometers, which were flown on the ISEE-A and -B spacecraft, are described. Results are demonstrated by several examples. Author

N82-15659# Kaman Tempo, Santa Barbara, Calif.

THE ROSCOE MANUAL. VOLUME 28-1: MOLECULAR BAND MODEL PARAMETERS FOR THERMAL EMISSIONS: EXPANDED WAVELENGTH COVERAGE Final Report, 9 Nov. 1979 - 31 Jan. 1981

Timothy L. Stephens and Alice L. Klein 31 Jan. 1981 51 p refs

(Contract DNA001-80-C-0030)

(AD-A106077; KT-81-002(R)-Vol-28-1) Avail: NTIS HC A04/MF A01 CSCL 04/1

The spectral range of band model parameters for the ROSCOE thermal emission has been extended to cover the 2- to 100-micron region. Sources for the new parameter compilation are documented, and graphical representations of the parameters at selected temperatures are presented. Author (GRA)

N82-15660# Teledyne Geotechnical, Alexandria, Va. Seismic Data Lab.

AN INVESTIGATION OF ATTENUATION, SCATTERING AND SITE EFFECTS ON REGIONAL PHASES

Zoltan A. Der, Anne Donnell, and Pamela J. Klouda VELA Seismological Center 23 Mar. 1981 100 p refs

(Contract F08606-79-C-0007; DARPA Order 2551)

(AD-A105995; SDAC-TR-81-4; VSC-TR-81-11) Avail: NTIS HC A05/MF A01 CSCL 17/10

Investigation of regional phase amplitudes at a large number of LRSM sites showed a pronounced increase of Pn, Pg, and Lg amplitudes at sedimentary structures relative to hard rock. In the early part of the coda and the main part of the wavetrain for Lg, lower order modes generated by mode conversion at local inhomogeneities must be present to explain the site variations and the coherence structure of Lg. A modification of Aki's scattering theory is presented to explain such observations. Analysis of the late coda of Lg showed high crustal Q values at RKON and much lower values of OB2NV. At OB2NV the crustal Q appears to be frequency dependent, increasing from 200 to about 600 in the 1 to 10 Hz band. Author (GRA)

N82-15661# Los Alamos Scientific Lab., N. Mex.

SCHLUMBERGER RESISTIVITY STUDY OF THE JEMEZ SPRINGS REGION OF NORTHWESTERN NEW MEXICO

Chris Pearson and Fraser Goff 1981 5 p refs Presented at the Geothermal Resources Council Ann. Meeting, Houston, Tex., 25-29 Oct. 1981

(Contract W-7405-eng-36)

(DE81-025302; LA-UR-81-1806; CONF-811015-10) Avail: NTIS HC A02/MF A01

Schlumberger resistivity soundings made in the Jemez Mountains of northwestern New Mexico, near the village of Jemez Springs, are presented. Three areas that have potential as low temperature geothermal reservoirs were identified. The areas are characterized by a localized zone of very low resistivity which represents the extent of geothermal water and correlates with the location of hot springs or recent volcanic rocks. Resistivities increase rapidly toward the margins of the anomalies, suggesting either variable porosities or variable temperatures and salinities in the reservoirs. DOE

N82-15662# Enertech Engineering and Research Co., Houston, Tex.

TEMPERATURE HISTORIES IN GEOTHERMAL WELLS: SURVEY OF ROCK THERMOMECHANICAL PROPERTIES AND DRILLING, PRODUCTION, AND INJECTION CASE STUDIES

Malcolm A. Goodman Albuquerque Sandia National Labs. Jul. 1981 86 p refs

(Contract DE-AC04-76DP-00789)

(DE81-029957; SAND-81-7128) Avail: NTIS HC A05/MF A01

Thermal and mechanical properties for geothermal formations are tabulated for a range of temperatures and stress conditions. Data were obtained from the technical literature and direct contacts with industry. Heat capacity, conductivity, diffusivity and undisturbed geothermal profiles are presented. Mechanical properties include Youngs modulus and Poisson ratio. Two GEOTEMP thermal simulations of drilling, production and injection are reported. Actual drilling, production, and injection histories were simulated. Results are documented in the form of printed GEOTEMP output and plots of temperatures versus depth, radius, and time. Wellbore temperatures during drilling as a function of depth; bit temperatures over the drilling history; cement temperatures from setting to the end of drilling; and casing and

formation temperatures during drilling, production, and injection are discussed. DOE

N82-15663# California Univ., Berkeley. Lawrence Berkeley Lab. Dept. of Chemistry.
SURFACE SCIENCE OF HETEROGENEOUS CATALYSIS: POSSIBLE APPLICATIONS IN ATMOSPHERIC SCIENCES
G. A. Somorjai Jun. 1981 15 p refs Presented at the Atmospheric Chem. Soc. Conf. on Atmospheric Sci., Albany, N.Y., 23 Jun. 1981
(Contract W-7405-eng-48)
(DE81-028135; LBL-12986; CONF-8106147-1) Avail: NTIS HC A02/MF A01

The catalyzed reactions of carbonaceous deposits and water vapor and the possible importance of trace metals and high surface area alumina silicates in atmospheric chemistry are discussed. The molecular details of heterogeneous catalytic processes and techniques were developed to determine the atomic surface structure, the composition, and oxidation states in the surface monolayer. The structure of the calaytic surface influences the surface chemical bonds of adsorbed molecules. Additives which are often electron donors (alkali metals) or electron acceptors (helogens) change the oxidation state of surface atoms, block sites, or change the surface structure and influence the surface reactivity. DOE

N82-15664# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
TERRESTRIAL SOLAR SPECTRAL MODELING
Richard E. Bird Jul. 1981 12 p refs Presented at the Com. Photovoltaics Measurement Workshop, Vail, Colo., 27-29 Jul. 1981
(Contracts DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE81-029067; SERI/TP-642-1343; CONF-810748-1) Avail: NTIS HC A02/MF A01

Two rigorous radiative transfer codes called SOLTRAN and BRITE are described. SOLTRAN was constructed from an atmospheric transmission code which uses a layered atmosphere model between sea level and 100-km altitude. This code includes no scattered radiation in its output. The BRITE code uses a Monte Carlo method and a layered atmosphere model, and accounts for both scattering and absorption. Spectra produced using the BRITE code are illustrated, and the use of SOLTRAN and BRITE for photovoltaic applications was demonstrated. Spectral comparisons between SOLTRAN, BRITE, and a spherical harmonics code are presented. Recommendations are made for improving the codes. DOE

N82-15665# Fraunhofer Inst., Freiburg (West Germany).
AURORAL SPECTROMETER AF6 FOR THE POLAR HIGH ATMOSPHERE ROCKET CAMPAIGN Final Report, Aug. 1980
Fritz Fischer, Manfred Knothe, and Gerhard Schmidtke Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 49 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-006; ISSN-0170-1339) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10,30

An extreme ultraviolet (EUV) spectrometer for the polar high atmosphere experiment and the results of two flights are presented. The optical concept is based on Rowland grating geometry using the blaze effect and providing a high efficiency spectrometer. Height, profiles of important spectral emissions such as O2 and O1 are obtained and strong differences in the spatial distribution of emissions with different optical depths are shown in the spectral region. Author (ESA)

N82-15666# Fraunhofer Inst., Freiburg (West Germany).
THE AEROS RETARDING POTENTIAL ANALYZER Final Report, Nov. 1980
Karl Spenner Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 114 p refs IN GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-007; ISSN-0170-1339) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 23,90

Analyzer was developed for in situ measurements of the most important thermal plasma parameters. An experiment was successfully flown on the two research satellites AEROS A and B. Plasma density, the electron and ion temperature, the most dominant ion constituents, and the superthermal electron fluxes were determined. A comparison with other independent measurements demonstrated the high reliability of the AEROS results and the improvement over other probe measurements. The achieved know-how was used for a number of other projects, e.g., in the NASA Pioneer Venus Program. Author (ESA)

N82-15667# Bonn Univ. (West Germany). Inst. fuer Astrophysik und Extraterrestrische Forschung.
THERMOSPHERIC STUDIES USING SATELLITES AEROS A AND B Final Report, Dec. 1979
Max Roemer, Werner Framke, Hans Joachim Beese (Siemans AG, Munich), Michael Jung (Brown, Boverie und Cie AG, Mannheim, West Germany), Egbert Richter (MBB, Munich), and Olaf Senzlober (Kraftwerke Union AG) Bundesministerium fuer Forschung und Technologie Feb. 1981 144 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-012; ISSN-0170-1339) Avail: NTIS HC A07/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 30,20

Atmospheric drag was analyzed in order to determine the atmospheric total density at perigee by the orbital drag technique. The principle of this technique, reduction of radio interferometer and radar observations, and the results of an orbit improvement procedure are presented. The aerodynamic drag coefficient of a cylindrical spin stabilized satellite was determined for all angles of attack. Measured values of the total atmospheric density and mass spectrometer data agree. The inverse orbital drag method was developed for full orbit comparisons. The COSPAR international reference atmosphere was adapted, using AEROS A mass spectrometer data. Experiences gained with a mass spectrometer and incoherent scatter data atmospheric model, based on all neutral gas measurements, are summarized. Negative ionospheric storms and the morphology of the thermospheric response to geomagnetic disturbances were studied. Author (ESA)

N82-15668# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
ONE AND TWO DIMENSIONAL MODELING OF THE PLANETARY BOUNDARY LAYER [EIN- UND ZWEIDIMENSIONALE MODELLIERUNG DER PLANETARISCHEN GRENZSCHICT]
Wolfgang Behnke Dec. 1980 65 p refs In GERMAN
(Mitt-29) Avail: NTIS HC A04/MF A01

One and two dimensional models of the planetary boundary layer were developed. The models are based on the shallow water equations with the turbulent kinetic energy equation as closure law. The one dimensional model is only slightly affected by initial values, but strongly by boundary conditions. The effect of closure laws on the results of the model in case of horizontal homogeneity as well as for highly inhomogeneous surfaces was studied. Two difference methods were compared for the two dimensional model. Temperature profiles obtained by the two dimensional model are extremely well corroborated by the measured values. The importance of orography in the investigation of the boundary layer jet flow is shown. Author (ESA)

N82-15669# Cologne Univ. (West Germany). Inst. fuer Geophysik und Meteorologie.
RADIATION CHARACTERISTICS OF CLOUD FIELDS [STRAHLUNGSEIGENSCHAFTEN VON WOLKENFELDERN]
Johannes Schmetz Jan. 1981 76 p refs In GERMAN
(Mitt-30) Avail: NTIS HC A05/MF A01

The influence of the micro and macrostructure of clouds on radiation characteristics was investigated, starting from radiation measurements on clouds and simultaneous measurements of microphysical characteristics. One dimensional radiation transport models were verified and the three dimensional model was qualitatively corroborated. The importance of the macrostructure as compared to the microstructure is clarified with a simple parameterization of the clouds macrostructure. The macrostructure dominates the integral radiation characteristics of a pierced cloud layer. Aircraft measurements under a pierced cloud cover show

the nonlinear dependence of solar transmission on the covering degree. the three dimensional model show qualitatively different behavior with respect to the zenith dependence of albedo and transmission of a cube shaped single cloud as compared to a cloud field. Author (ESA)

N82-15670# Fraunhofer Inst., Freiburg (West Germany).
IMPEDANCE PROBE: THE ELECTRON DENSITY EXPERIMENT ONBOARD THE AERONOMY SATELLITES AEROS Final Report, Nov. 1980
Eugen Neske and Rainer Kist Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 101 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-008; ISSN-0170-1339) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 21,20

The AEROS-B electron density impedance probe (IP) with its main theoretical aspects, technical solution and data acquisition and data reduction are described. The IP subsystems which includes the IP sensor and electronic groups, such as resonance frequency and phase measurement, sensor potential control, measuring program control, and inflight calibration are discussed. Absolute electron densities with high accuracy and spatial resolution in the altitude range 220 to 900 km are measured. Comparisons with accompanying AEROS-B experiments as well as synoptic measurements from ground stations and other satellites are presented. Geophysical phenomena, such as the midlatitude electron density trough, the South Atlantic anomaly, and polar density fluctuations are investigated. Author (ESA)

N82-15671# Max-Planck-Institut fuer Kernphysik, Heidelberg (West Germany).
SOUNDING ROCKET PROGRAM AERONOMY PROJECT: 'POLAR HIGH ATMOSPHERE' MASS SPECTROMETER EXPERIMENT Final Report, Feb. 1981
Dieter Krankowsky, Peter Laemmerzahl, and Werner Loos Bonn Bundesministerium fuer Forschung und Technologie Jul. 1981 50 p refs In GERMAN; ENGLISH summary
(Contract BMFT-WRK-RV-14-B101/74)
(BMFT-FB-W-81-027; ISSN-0170-1339) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 10,50

The response of the thermosphere during a magnetic substorm was studied in a sounding rocket mass spectrometer experiment. The instrument, laboratory calibration procedure, data analysis, and geophysical conditions during the launch are described. It is shown that the ion concentrations are greatly enhanced by the storm activity. Primary ionization rates are derived from the measured altitude profiles of singly ionized O, NO and O2 ions by a one dimensional model, ion chemistry and transport. The rates are compared with the rates calculated from the energetic electron fluxes measured with an auroral particle spectrometer. Author (ESA)

N82-15672# National Center for Atmospheric Research, Boulder, Colo. Atmospheric Quality Div.
THE CHON PHOTOCHEMISTRY OF THE TROPOSPHERE: GRASSLANDS PROJECT (SUMMER COLLOQUIUM 1980) Final Report
Anthony Delany 1980 182 p refs Proceedings of Colloquium held at Boulder, Colo., 1980
(Grant NSF ATM-77-23757)
(PB81-233140; NCAR/CQ-7) Avail: NTIS HC A09/MF A01 CSCL 04A

A comprehensive set of photochemically action carbon, hydrogen, oxygen, and nitrogen compounds together with a modelling effect aimed at reproducing the interaction of these species were determined. Species and parameters measured included paraffinic, olefinic and aromatic hydrocarbons, CH4, H2, CO, NO, NOX, HNO3, (HCHO), O3, H2O2, H2O, OH, J(NO2), J(O3) and T. The experimental techniques in the measurements and an intercomparison between measurements and model results are discussed. Ozone fluxes are measured by both an aircraft mounted correlation technique and a tower gradient method. Destruction flux measurements are also made for NOX and HNO3. GRA

N82-15673# California Univ., Santa Barbara. Computer Systems Lab.
USE OF ENVIRONMENTAL SATELLITE DATA FOR INPUT TO ENERGY BALANCE SNOWMELT MODELS Final Report
Jeff Dozier Dec. 1980 125 p refs
(Grant NOAA-04-8-MO)
(PB81-227795; TR-CSL-8001; NOAA-81050501) Avail: NTIS HC A06/MF A01 CSCL 04A

The development of solar and longwave radiation models for alpine snow covered terrain, techniques for atmospheric correction of satellite radiometric data and for snow albedo determination from satellite, a very fast solution to the terrain horizon problem, investigations of the use of NOAA satellite data for snow surface temperature, mapping, and work on canopy cover measurements from satellite for use in solar and longwave radiation models are described. GRA

N82-15674# University of Southern California, Los Angeles. Dept. of Civil Engineering.
WATER WAVES GENERATED BY THREE DIMENSIONAL BED MOTION: ABSTRACT
J. J. Chang and J. J. Lee 1980 7 p refs Abstract of paper to be presented at the Intern. Tsunami Symp., Japan, 25-29 May 1981
(Grants NSF ENV-77-01599; NOAA-NA-80-AA-D-00100)
(PB81-238172; NSF/RA-800553) Avail: NTIS HC A02/MF A01 CSCL 08K

Dipole dislocation of the sea floor with a finitie aspect ratio (length/width of the bottom dislocation) is reported. The method for three dimensional bed motion in the case of rectangular bed upthrust of finite aspect ratio was applied. A potential flow is assumed; thus the velocity potential satisfies Laplace's equation and linearized boundary conditions. Fourier transform for the spatial variables and the Laplace transform for the time variable are applied. Results on water surface profiles for different lengths/widths of bottom dislocation were obtained and features of generated wave patterns were found. Programs for obtaining wave profiles along any arbitrarily chosen coordinates by a mathematical plantom are developed. GRA

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N82-15675 Deutscher Wetterdienst, Offenbach am Main (West Germany).
REPORTS FROM THE GERMAN METEOROLOGICAL SERVICE. NUMBER 155: TWO HUNDRED YEARS OF METEOROLOGICAL OBSERVATIONS AT HOHENPEISSENBERG (1781-1980) [BERICHTE DES DEUTSCHEN WETTERDIENSTS, NR 155: 200 JAHRE METEOROLOGISCHE BEOBACHTUNGEN AUF DEM HOHENPEISSENBERG (1781-1980)]
Walter Attmannspacher 1981 230 p refs In GERMAN Original contains color illustrations
(ISSN-0072-4130; ISBN-3-88148-184-2) Avail: Issuing Activity

Research into the free atmosphere, e.g., ozone studies and concomitant radiosondes, is outlined. Rainfall measurements are described: point measurements, using the ombrometer HP, and measurements on a surface, using a weather radar system. Author (ESA)

N82-15676 Freie Univ., Berlin (West Germany). Inst. fuer Meteorologie.
METEOROLOGICAL DATA, VOLUME 134, NUMBER 3: THE EVOLUTION OF THE CIRCULATION PATTERN AT THE 100 mbar LEVEL FOR THE YEARS 1973 AND 1974 ILLUSTRATED BY MAPS OF MONTHLY MEAN VALUES [METEOROLOGISCHE ABHANDLUNGEN, BAND 134, HEFT 3: DER ZIRKULATIONSVERLAUF IN DER 100-MBAR-FLAECHE IN DEN JAHREN 1973 UND 1974 AN HAND MONATLICHER MITTELKARTEN]

Ingrid Buschner 1980 171 p refs In GERMAN; ENGLISH summary Original contains color illustrations
(ISSN-0342-4332) Avail: Issuing Activity

A compilation of monthly averaged maps during 1973 and 1974 of height and temperature at the 100 mbar level, monthly changes, deviations from the long-term mean 1951 to 1970, and their latitude anomalies over the Northern Hemisphere is presented. The maps are evaluated, relationships to the troposphere and the middle stratosphere are shown, and comparisons are made with climatological series. The monthly mean values of height and temperature are given in table form. Author (ESA)

N82-15677*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
CLOUD-ENCOUNTER AND PARTICLE-CONCENTRATION VARIABILITIES FROM GASP DATA
Gregory D. Nastrom (Control Data Corp., Minneapolis), James D. Holdeman (NASA. Lewis Research Center, Cleveland), and Richard E. Davis Dec. 1981 245 p refs
(NASA-TP-1886; L-14483) Avail: NTIS HC A11/MF A01 CSCL 04B

Summary statistics, tabulations, and variability studies are presented for cloud encounter and particle concentration data taken as part of the NASA global atmospheric sampling program. Cloud encounter was experienced in about 15 percent of the data samples; however, the percentage varies with season, latitude, and altitude (particularly distance from the tropopause). In agreement with classical storm models, the data show more clouds in the upper troposphere in anticyclones than in cyclones. The concentration of particles with a diameter greater than 3 micron also varies with time and location, depending primarily on the horizontal extent of cloudiness. Some examples of the application of the statistical data to the estimation of the frequency of cloud encounter and laminar flow loss to be expected on long range airline routes are also presented. Author

N82-15678*# Computer Sciences Corp., Pocomoke City, Md.
AN AUTOMATED TECHNIQUE FOR ESTIMATING DAILY PRECIPITATION OVER THE STATE OF VIRGINIA Final Report
Walton A. Follansbee and Lloyd W. Chamberlain, III Sep. 1981 95 p refs
(Contract NAS6-2947)
(NASA-CR-156883) Avail: NTIS HC A05/MF A01 CSCL 04B

Digital IR and visible imagery obtained from a geostationary satellite located over the equator at 75 deg west latitude were provided by NASA and used to obtain a linear relationship between cloud top temperature and hourly precipitation. Two computer programs written in FORTRAN were used. The first program computes the satellite estimate field from the hourly digital IR imagery. The second program computes the final estimate for the entire state area by comparing five preliminary estimates of 24 hour precipitation with control raingage readings and determining which of the five methods gives the best estimate for the day. The final estimate is then produced by incorporating control gage readings into the winning method. In presenting reliable precipitation estimates for every cell in Virginia in near real time on a daily on going basis, the techniques require on the order of 125 to 150 daily gage readings by dependable, highly motivated observers distributed as uniformly as feasible across the state. A.R.H.

N82-15679*# Operations Research, Inc., Silver Spring, Md.
ANALYSIS OF METEOROLOGICAL SATELLITE LOCATION AND DATA COLLECTION SYSTEM CONCEPTS Final Report, 3 Jun. - 3 Dec. 1981
R. G. Wallace and D. L. Reed Dec. 1981 96 p refs
(Contract NAS5-26604)
(NASA-CR-166763; TR-1989) Avail: NTIS HC A05/MF A01 CSCL 04B

A satellite system that employs a spaceborne RF interferometer to determine the location and velocity of data collection platforms attached to meteorological balloons is proposed. This meteorological advanced location and data collection system (MALDCS) is intended to fly aboard a low polar orbiting satellite. The flight instrument configuration includes antennas supported on long deployable booms. The platform location and velocity estimation errors introduced by the dynamic and thermal behavior of the antenna booms and the effects of the presence of the booms on the performance of the spacecraft's attitude control system, and the control system design considerations critical to stable operations are examined. The physical parameters of the Astromast type of deployable boom were used in the dynamic and thermal boom analysis, and the TIROS N system was assumed for the attitude control analysis. Velocity estimation error versus boom length was determined. There was an optimum, minimum error, antenna separation distance. A description of the proposed MALDCS system and a discussion of ambiguity resolution are included. S.L.

N82-15680*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
NOSS-SCAT WIND DIRECTION ALIAS REMOVAL Final Report
K. Sam Shanmugan, V. Narayanan, and J. Stiles Jan. 1982 44 p
(Grant NAG1-117)
(NASA-CR-165069; RSL-TR-515-1) Avail: NTIS HC A03/MF A01 CSCL 04B

The use of automated algorithms for removing aliases in NOSS-SCAT data is reported. The algorithms used for alias removal consist of histogram analysis, local averaging and curve fitting. The histogram analysis is used to determine the degree of homogeneity of the wind field defined by the largest probability alias vector at each grid point. The alias directions are compared with the preferred direction at each grid location and one of the multiple aliases is chosen as the true direction. E.A.K.

N82-15681# Royal Netherlands Meteorological Inst., De Bilt.
NETWORK FOR THE MEASUREMENT OF THE CHEMICAL COMPOSITION OF PRECIPITATION IN THE NETHERLANDS Annual Report, 1980 [MEETNET VOOR BEPALING VAN DE CHEMISCHE SAMENSTELLING VAN DE NEERSLAG IN NEEDERLAND]
1981 60 p refs Prepared in cooperation with Rijksinst. voor de Volksgezondheid
(KNMI-156-3; RIV-217810-003) Avail: NTIS HC A04/MF A01

From January 1978 at 12 stations and from January 1979 at 13 stations monthly samples were taken for the determination of the chemical composition of precipitation. A practical problem remains the droppings of birds in the raingauge. A description is given of the analytical procedures used. The unit of concentration used in umol/1. Multi-annual average values (1978 to 1989) and annual and semiannual averages of the year 1980 of 14 components are presented in the form of maps showing some isolines. T.M.

N82-15682# Royal Netherlands Meteorological Inst., De Bilt.
YEARBOOK A METEOROLOGY VOLUME 132 Annual Report
1981 76 p In ENGLISH and DUTCH
(KNMI-97-132) Avail: NTIS HC A04/MF A01; KNMI, De Bilt, Netherlands FL 17,50

All data are based on the 24-hour period 0-24 U.T.C. The normals recorded are averages computed from measurements made during the period 1931-1960. The observations were made at 49 meteorological stations. Details on the stations and the position of instruments are given. T.M.

N82-15683# Royal Netherlands Meteorological Inst., De Bilt.
PRECIPITATION Annual Report, 1980
1981 146 p In ENGLISH and DUTCH
(KNMI-117-1981) Avail: NTIS HC A07/MF A01; KNMI, De Bilt, Netherlands FL 10

The precipitation stations of the Royal Netherlands Meteorological Institute, spread over fifteen areas, are indicated by their codenumber. Details on the stations are given. The measurements are made at 7.55 h U.T.C. (= 8.55 h C.E.T) and recorded on the day of measuring in mm. Author (ESA)

N82-15684# Royal Netherlands Meteorological Inst., De Bilt. Oceanographic Research Div.
METEOROLOGICAL AND OCEANOGRAPHIC OBSERVATIONS ON BOARD NETHERLANDS LIGHTVESSELS AND

THE LIGHTPLATFORM 'GOEREE' IN THE NORTH SEA Annual Report, 1976
1981 143 p In ENGLISH and DUTCH
(KNMI-141-28) Avail: NTIS HC A02/MF A01; KNMI, De Bilt, Netherlands FL 17,50

Three-hourly meteorological and wave observations as well as hourly current and salinity measurements were compiled. Tables show: (1) meteorological results; (2) oceanographic results; (3) general air circulation, air pressure, precipitation, and fog; (4) visibility and cloud amount; (5) air temperature; (6) sea surface temperature; (7) air-sea temperature differences; and (8) wind and wave frequencies. A.R.H.

N82-15685# Royal Netherlands Meteorological Inst., De Bilt.
SYNOPTIC AND UPPER AIR OBSERVATIONS IN THE NETHERLANDS, VOLUME 24 Annual Report, 1979
1980 398 p In ENGLISH and DUTCH
(KNMI-142-24) Avail: NTIS HC A17/MF A01; KNMI, De Bilt, Netherlands FL 25

Tables show (1) surface observations of the weather situation from Netherlands land stations, the lightvessel and from the automatic reporting station on the fixed platform; (2) upper air observations of pressure, temperature, relative humidity, wind direction, wind speed at De Bilt; (3) upper air observations of wind direction and wind speed at De Bilt; and (4) mean values for each month and for the year computed from the data of temperature, relative humidity, wind direction and wind speed. A.R.H.

N82-15686# Royal Netherlands Meteorological Inst., De Bilt.
SYNOPTIC AND UPPER AIR OBSERVATIONS IN THE NETHERLANDS, VOLUME 25 Annual Report, 1980
1981 400 p In ENGLISH and DUTCH
(KNMI-142-25) Avail: NTIS HC A17/MF A01; KNMI, De Bilt Netherlands FL 25

Weather reports are given in code according to: (1) surface observations of the weather situation from Netherlands land stations, the lightvessel and from the automatic reporting station on the fixed platform at 00, 06, 12 and 18 hours G.M.T.; (2) upper air observations of pressure, temperature, relative humidity, wind direction, wind speed at De Bilt at 00 and 12 hours G.M.T.; and (3) upper air observations of wind direction and wind speed at 06 and 18 hours G.M.T.. Mean values for each month and for the year were computed from the data of temperature, relative humidity, wind direction and wind speed and are presented in tables. A.R.H.

N82-15687# Virginia Univ., Charlottesville. Dept. of Environmental Sciences.
THE BEHAVIOR OF SURFACE WIND AND THERMODYNAMIC FIELDS IN THE PRESENCE OF DEEP CONVECTION
Henry J. Cooper and Michael Garstang May 1981 257 p refs
(Contract DAAG29-80-K-0053; Grant NSF ATM-78-08865)
(AD-A105895; TR-5; ARO-16816.2-GS) Avail: NTIS HC A12/MF A01 CSCL 04/2

Surface wind measurements, in fine mesh networks to calculate surface divergence on the convective scale are presented. After the initiation of a convective scale feedback mechanism by the peninsular scale forcing, downdraft induced convergence maintains and intensifies the convective scale activity long after the peninsular scale forcing has passed its peak. A feedback mechanism between the larger and convective scale is established. It is suggested that decline in the efficiency of the convective scale feedback mechanism is related to the rate of change in the peninsular scale forcing. The evolution of the convective activity from a condition of weak convection to a condition of deep convection depends upon the amount of moisture mixed up into the lower cloud layer by the shallower convection. It is shown that diurnal convective process is a very efficient mechanism in the vertical mixing of water vapor, and a relatively inefficient mechanism in production of rainfall. E.A.K.

N82-15688# Maryland Univ., College Park. Dept. of Meteorology.
SATELLITE OBSERVED PLANTETARY ALBEDO AND ITS PARAMETERIZATION Final Report
Alan Robock and Robert Lutz Apr. 1981 42 p refs
(Contract NA79AA-D-00094)
(PB81-238974; NOAA-81062918) Avail: NTIS HC A03/MF A01 CSCL 04B

Planetary albedo data derived from satellites were compared. The variability of the albedo were calculated using the continuous data set of Winston et al. The data were also compared to a parameterization of Thompson. Because of the different observation methods and the variability of the data, it is impossible to say whether any of the data collections of the parameterization gives the best values for planetary albedo. The parameterization was inverted to use the data to calculate cloudiness, but this did not give consistent results. GRA

N82-15689# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
STATUS REPORT ON DOE-SPONSORED METEOROLOGICAL MODEL VALIDATION PROGRAM
C. E. Bailey and D. W. Pepper 1981 7 p refs Presented at the Symp. on Intermediate Range Atmospheric Transport Process and Technol. Assessment, Gatlinburg, Tenn., 1 Oct. 1981 Submitted for publication
(Contract DE-AC09-76SR-00001)
(DP-MS-81-20; CONF-811005-1) Avail: NTIS HC A02/MF A01

Mesoscale meteorological models are evaluated. Extensive Kr-85 integrated air concentration measurements and meteorology data obtained in the vicinity of the Savannah River Plant were used for all calculations. DOE

N82-15690# Los Alamos Scientific Lab., N. Mex.
EXPERIMENTAL DESIGN AND DATA OF THE AUGUST 1980 CORRAL GULCH NOCTURNAL WIND EXPERIMENT, PICEANCE BASIN, NORTHWESTERN COLORADO
William E. Clements, Sue Goff, John A. Archuleta, and Sumner Barr Jul. 1981 200 p refs
(Contract W-7405-eng-36)
(DE81-028665; LA-8895-MS) Avail: NTIS HC A09/MF A01

The characteristics of the nocturnal drainage and upper level winds were investigated. Intensive meteorological measurements were made on four experimental nights using a network of surface stations, free and captive balloon vertical profilers, an acoustic sounder, and the release and sampling of sulfur hexafluoride tracer. The experimental design and the data collected during this study are summarized. DOE

N82-15691# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Experimentelle Atmosphaerenphysik 1.
CLOUD DROPLET MEASUREMENT METHODS: A BIBLIOGRAPHY
Klaus-Peter Schickel Feb. 1981 120 p refs In GERMAN; ENGLISH summary
(DFVLR-MITT-81-04) Avail: NTIS HC A06/MF A01; DFVLR, Cologne DM 23,30

All important techniques to measure cloud and fog droplets are mentioned in this compendium. Measurement methods for cloud droplets and cloud droplet size distributions are emphasized. J.M.S.

N82-15692# Research Inst. of National Defence, Umea (Sweden). Huvudavdelning 4.
A MODEL FOR CALCULATING THE ABSORBED DOSE TO POPULATIONS TAKING LOCAL WEATHER STATISTICS INTO CONSIDERATION
Leif Svensson Oct. 1981 17 p refs
(FOA-C-40140-A3) Avail: NTIS HC A02/MF A01

A mathematical model of the parameters needed to assess radiation absorbed by populations exposed to radiation released in nuclear reactor accidents is presented. The model is based on the Gaussian model for atmospherical dispersion of radionuclides. Probability of giving the number of individuals receiving absorbed doses greater than specified dose limits are calculated. The probability of an accidental release is not taken into account. A core meltdown accident at a 1700 MWth boiling water reactor was simulated. It is found that the highest irradiation occurs for Pasquill class D weather, windspeed 15 m/sec and no precipitation. Author (ESA)

N82-15693# Illinois State Water Survey, Urbana.
CLIMATOLOGY OF HIGH DAMAGING WIND IN ILLINOIS
Stanley A. Changnon, Jr. 1980 50 p refs
(PB81-234767; ISWS/RI-95/80) Avail: NTIS HC A03/MF A01 CSCL 04B

Although there is a lack of definitive data, historical data from 43 cooperative substations and 6 first order stations, plus recent wind sensor data from two (short-period) dense networks and a 10-year sample of recorded wind speed data at one location, were used to develop basic climatological information on high winds in Illinois. Spatial and temporal variations in both averages and extremes were treated to dimensionalize the incidence of days with high winds. Among the conclusions are that damaging straight line winds peak in the spring and are least frequent in early fall. Summer thunderstorms are the major producers of high winds, but in all other seasons deep low center passages are the major cause. GRA

N82-15694# Environmental Research and Technology, Inc., Concord, Mass.
ON-SITE METEOROLOGICAL INSTRUMENTATION REQUIREMENTS TO CHARACTERIZE DIFFUSION FROM POINT SOURCES: WORKSHOP REPORT Final Report, Sep. 1979 - Sep. 1980
David Strimaitis, Gale Hoffnagle, and Arthur Bass Apr. 1981 124 p refs
(Contract EPA-68-02-3282)
(PB81-247223; EPA-600/9-81-020) Avail: NTIS HC A06/MF A01 CSCL 04B

Specific measurement technique and accuracies are recommended. Recommendations to the National Weather Service (NWS) about collecting and archiving meteorological data that would best support air quality dispersion modeling objectives are presented. Recommendations on standardization of meteorological data reporting and quality assurance programs are discussed. T.M.

N82-15695# Meteorology Research, Inc., Altadena, Calif.
MRI AIRBORNE RESEARCH STUDIES IN SUPPORT OF HIPLEX Final Report, May 1975 - Dec. 1980
D. M. Takeuchi Dec. 1980 203 p refs
(Contract DI-14-06-D-7699)
(PB81-243750; MRI-81-FR-1799) Avail: NTIS HC A10/MF A01 CSCL 04B

Work performed in support of HIPLEX for the period May 1975 to December 1980 is summarized. Subjects covered include: descriptions of the measurement and data systems of the cloud physics research aircraft, the field operations, the results, and conclusions. The cloud base and supercooled cloud regions and intensive case studies of individual storms are analyzed. GRA

N82-15696# National Oceanic and Atmospheric Administration, Rockville, Md. Library and Information Services Div.
IMPACT OF WEATHER AND CLIMATE ON AGRICULTURE: A SELECTED BIBLIOGRAPHY
Gary H. Adams, comp., Robert R. Walter, comp., and Douglas A. McManus, comp. May 1981 132 p
(PB81-245003; NOAA-81063001) Avail: NTIS HC A07/MF A01 CSCL 04B

This bibliography covers the impact of weather and climate on various socioeconomic and political sectors of modern society relating to agriculture. The references were retrieved by computer searching of about 30 bibliographic databases covering scientific, technical and social science topics. Time coverage is limited to 1970-1979. GRA

N82-15697# National Oceanic and Atmospheric Administration, Washington, D. C. Office of Federal Coordinator for Meteorological Services and Supporting Research.
NATIONAL HURRICANE OPERATIONS PLAN
May 1981 81 p
(PB81-247231; NOAA-FCM-P12-1981; NOAA-81071411) Avail: NTIS HC A05/MF A01 CSCL 04B

The hurricane warning service is an interdepartmental effort to provide the nation and designated international recipients with environmental data, forecasts, and assessments concerning tropical and subtropical weather systems. GRA

N82-15698# National Oceanic and Atmospheric Administration, Washington, D. C.
ENVIRONMENTAL SATELLITE IMAGERY, MARCH 1981
May 1981 69 p refs
(PB81-248049; KMRD-5.4-8103) Avail: NTIS HC A04/MF A01 CSCL 04B

Current cloud data obtained by operational environmental satellites was documented. Daily global satellite imagery is recorded in condensed form as a guide to data stored in the NOAA archives and is designed to help users select data for research and climatological use. The polar hemispheric mosaics reproduced in this catalog are derived from the advanced very high resolution radiometer (AVHRR (GSC)) data, and prepared daily by high speed computers. Visible and infrared swaths obtained while the satellite is northbound are used in the 15L mosaics from TIROS-N and the infrared channel only in the 17L mosaics from NOAA-6, NOAA-7 will include both the infrared and visible mosaics from the 14L pass. Infrared data swaths obtained during southbound passage of TIROS-N are labeled 03L, NOAA-6 are labeled 07L and NOAA-7 will be labeled 02L. GRA

N82-15477# Joint Publications Research Service, Arlington, Va.
MODEL OF CLIMATE AND GLOBAL ECOLOGY
Vladimir Valentinovich Aleksandrov and Nikita Nikolayevich Moiseyev *In its* USSR Rept.: Earth Sci., No. 18 (JPRS-79631) 10 Dec. 1981 p 1-13 refs Transl. into ENGLISH from Priroda (Moscow), no. 9, Sep. 1981 p 68-71 (For primary document see N82-15476 06-42)
Copyright. Avail: Issuing Activity

N82-15478# Joint Publications Research Service, Arlington, Va.
POTENTIAL CHANGE IN CLIMATE BY YEAR 2000
O. A. Drozdov *In its* USSR Rept.: Earth Sci., No. 18 (JPRS-79613) 10 Dec. 1981 p 14-15 Transl. into ENGLISH from Novoye V Zhizni, Nauke, Tekhn., Ser. Nauka o Zemle (Moscow), No. 8, Aug. 1981 p 32-34 (For primary document see N82-15476 06-42)
Avail: Issuing Activity

N82-15479# Joint Publications Research Service, Arlington, Va.
CLIMATES OF PAST AS A MODEL OF FUTURE CLIMATE
D. D. Kvasov *In its* USSR Rept.: Earth Sci., No. 18 (JPRS-79631) 10 Dec. 1981 p 16-17 Transl. into ENGLISH from Novoye V Zhizni, Nauke Tekhn. Ser. Nauka o Zemle (Moscow), no. 8, Aug. 1981 p 30-32 (For primary document see N82-15476 06-42)
Avail: Issuing Activity

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N82-15699*# Oregon State Univ., Corvallis. Climatic Research Inst.
ANALYSIS OF THE SURFACE HEAT BALANCE OVER THE WORLD OCEAN Final Technical Report, 1 Dec. 1978 - 30 Sep. 1981
Steven K. Esbensen Dec. 1981 242 p
(Grant NsG-5308)
(NASA-CR-165072) Avail: NTIS HC A11/MF A01 CSCL 08C

It is possible to estimate long term monthly mean latent and sensible heat fluxes over the ocean to within > or approximately 20% relative accuracy of the bulk aerodynamic formulas, by using observations of the monthly mean surface wind speed and the monthly mean sea air temperature and humidity differences. It is possible to make an estimate of the fluxes on a month to month basis from monthly averaged surface data. S.L.

N82-15700# Naval Surface Weapons Center, Dahlgren, Va. Strategic Systems Dept.

GLOBAL OCEAN TIDES. PART 7: THE DIURNAL PRINCIPAL SOLAR TIDE (P1), ATLAS OF TIDAL CHARTS AND MAPS Final Report

E. W. Schwiderski May 1981 88 p refs Sponsored in part by the National Geodetic Survey

(AD-A105612; NSWC/TR-81-220) Avail: NTIS HC A05/MF A01 CSCL 08/3

In Part 1 (Schwiderski, 1978a) of this report, a unique hydrodynamical interpolation technique was introduced, extensively tested, and evaluated in order to compute partial global ocean tides in great detail and with a high degree of accuracy. This novel method has been applied to construct the diurnal principal solar (P1) ocean tide with a relative accuracy of better than 5 cm anywhere in the open oceans. The resulting tidal amplitudes and phases are tabulated on a 1 deg X 1 deg grid system in an atlas of 42 deg X 71 deg overlapping charts covering the whole oceanic globe. A corresponding atlas of global corange and cotidal maps is included to provide the reader with a quick general overview of the major tidal phenomena. The specifying hydrodynamical parameters of the model are listed along with quoted sources of empirical tide data, and significant tidal features are explained and discussed. As expected, since the periods of the diurnal tides P1 (24.07h) and K1 (23.93 h) differ by only 0.14 h, these two tides resemble very closely each other (compare Part 4). Significant differences occur only in regions of rapid tidal variations. Of course, P1 resembles also the diurnal O1 tide but to a visibly lesser degree (see Part 5).

Author (GRA)

N82-15701# Texas Univ. at Austin. Bureau of Economic Geology.

SALINITY OF DEEP FORMATION WATERS, TEXAS GULF COAST: PRELIMINARY RESULTS

R. A. Morton, J. S. Posey, and C. M. Garrett, Jr. 1981 10 p refs Presented at the 5th Geopressured-Geothermal Energy Conf., Baton Rouge, La., 13 Oct. 1981

(Contracts DE-AC08-79ET-27111; DE-AC08-79ET-27112)

(DE81-029773; CONF-811026-6) Avail: NTIS HC A02/MF A01

The vertical variation in salinity was studied. Salinities are lowest in the transition zone, but in many areas, salinities of geopressured reservoirs tend to gradually increase with depth. High salinities at depth explained by hyperfiltration and proximity to salt domes are discussed. Both mechanisms are responsible for high salinities in the Frio Formation; however, concentrated brines are not necessarily indicative of salt dissolution as shown by water analyses from south Texas. This area is far removed from any known salt accumulations and yet salinities of formation water from some fields are greater than 200,000 ppM. Reservoirs that are stratigraphically equivalent but separated by minor faults produce waters with similar salinities. The greatest differences in salinity are found in stratigraphically separated reservoirs.DOE

N82-15702# Research Inst. of National Defence, Linkoeping (Sweden). Huvudavdelning 3

LASER DEPTH SOUNDING IN THE BALTIC SEA

Haakan Klevebrant, Joergen Lexander, Ove Steinvall, and Anders Widen May 1981 45 p refs

(FOA-C-30219-E1) Avail: NTIS HC A03/MF A01

Tests were made over areas with different water clarities. Simultaneous sea truth measurements were done from boats. Maximum depth penetration of more than 30 m is obtained, in good agreement with theoretical estimation. Mapping of an area close to a large ship route shows good agreement between sonar and laser profiles down to 20 m depth. The experiment demonstrates the great potential of a laser bathymeter for remote monitoring of depth and turbidity in Swedish coastal water. A scanning system gives a significant reduction of cost and increases the speed of data collection for hydrographic charting.

Author (ESA)

N82-15703# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Lab.

ANALYSIS OF METHODOLOGIES USED FOR THE ASSESSMENT OF WETLAND VALUES Final Technical Report

Robert I. Lonard, Ellis Clairain, Jr., Robert T. Huffman, J. W. Hardy, Linda D. Brown, Paul E. Ballard, and Janet W. Watts Sep. 1981 81 p refs Sponsored in part by Water Resources Council

(PB81-245664) Avail: NTIS HC A05/MF A01 CSCL 08J

Methodologies that assess inland and coastal wetlands functions are identified and evaluated. GRA

N82-15704# National Oceanic and Atmospheric Administration, Boulder, Colo. Office of Marine Pollution Assessment.

PROCEEDINGS OF A SYMPOSIUM ON PRELIMINARY RESULTS FROM THE SEPTEMBER 1979 RESEARCHER/PIERCE IXTOC-1 CRUISE

Donald K. Atwood Dec. 1980 533 p refs Symp. held at Key Biscayne, Fla., 9-10 Jun. 1980

(PB81-246068; NOAA-81071401) Avail: NTIS HC A23/MF A01 CSCL 08J

A complete listing of the types and numbers of samples collected is given. Compounds resulting from photooxidation experiments conducted on IXTOC-1 crude oil were the same as those found in situ in the area of the spill plume. These same compounds were formed by microbial action in microcosm experiments conducted in the dark on board the Researcher, but in differing amounts and ratios. It is concluded that the entire microbial community responds to the spilled oil and that a population of petroleum degrading bacteria can grow rapidly enough to consume the oil at relatively rapid rates. T.M.

N82-15705# Texas A&M Univ., College Station. Research Foundation.

OVERPRESSURED MARINE SEDIMENTS. VOLUME 3: THERMAL CONDUCTIVITY, ELECTRICAL RESISTIVITY, AND PERMEABILITY OF SATURATED SEDIMENT AT VARIOUS POROSITIES Final Report

James Keith Enderby and Louis J. Thompson 14 Jul. 1981 120 p refs

(Grant DI-14-08-0001-17289)

(PB81-243578) Avail: NTIS HC A06/MF A01 CSCL 08J

The thermal conductivity of sea water saturated clays, kaolinite, illite and bentonite, and sea water saturated Ottawa sand was determined in both the horizontal and vertical direction. All clays showed anisotropic thermal conductivity. The horizontal thermal conductivity of illite and bentonite was independent of porosity. The horizontal thermal conductivity of kaolinite increases as porosity decreased. It is found that the saturated clay electrical resistivity substantially decreases as either the applied voltage or duration of test increased. The same trend was observed in both the horizontal and vertical direction using either alternating current or direct current. GRA

N82-15706# Hawaii Univ., Honolulu. Lab. of Oceanographic Engineering.

WAVE ATTENUATION AND WAVE SET UP ON A COASTAL REEF

Franciscus Gerritsen Mar. 1981 440 p refs

(Grants NOAA-04-6-158-4402; NOAA-04-6-158-44114)

(PB81-246159; UNIHI-SG-CR-81-05; LOOK-LAB-81-48; NOAA-81071403) Avail: NTIS HC A19/MF A01 CSCL 08C

The breaking of waves on coastal reefs, with special emphasis on energy dissipation (wave height attenuation), wave spectrum modification and characteristics of wave set up is examined. The hydrodynamic processes associated with waves breaking on a reef and the goals are described. The following topics are discusssed: aspects of nonlinear waves, significance bottom friction in wave dissipation over a shallow reef, various aspects of wave set up, effects of a modulating wave train on the wave set up on the reef, and the spectrum for various water depths. GRA

N82-15707# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.

HF RADAR MEASUREMENTS OF SURFACE CURRENTS IN THE GERMAN BIGHT DURING MARSEN PHASE 2

M. M. Janopaul, A. S. Frisch, and R. S. Lyons May 1981 59 p refs

(PB81-244410; NOAA-TM-ERL-WPL-71; NOAA-81063011) Avail: NTIS HC A04/MF A01 CSCL 08C

Surface currents were measured by HF radar (called CODAR) situated in the German Bight. Hourly maps of instantaneous

surface currents, tidal current ellipses, and direct current averages are presented. Analysis of the surface flow identified the principal focal feature as cyclonic semidiurnal tidal currents. It is shown that the surface flow is a relatively weak cyclic pattern. GRA

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N82-15708*# National Aeronautics and Space Administration, Washington, D. C.
USSR SPACE LIFE SCIENCES DIGEST Annual Summary
Courtland S. Lewis, ed. and Kristy L. Donnelly, ed. 1980 72 p refs Prepared jointly with BioTechnology, Inc., Arlington, Va.
(Contract NASw-3469)
(NASA-TM-84080) Avail: NTIS HC A04/MF A01 CSCL 06C

Research in exobiology, life sciences technology, space biology, and space medicine and physiology, primarily using data gathered on the Salyut 6 orbital space station, is reported. Methods for predicting, diagnosing, and preventing the effects of weightlessness are discussed. Psychological factors are discussed. The effects of space flight on plants and animals are reported. Bioinstrumentation advances are noted. R.J.F.

N82-15709*# George Washington Univ., Washington, D.C. Dept. of Medical and Public Affairs.
A COMPENDIUM OF HYPOKINETIC AND HYPODYNAMIC ANIMAL STUDIES Contractor Report, Dec. 1981
Linda G. Pleasant and Phyllis T. Axelrod Washington NASA Dec. 1981 734 p
(Contract NASw-3165)
(NASA-CR-3485) Avail: NTIS HC A99/MF A01 CSCL 06C

This compendium organizes and summarizes the scientific literature dealing with the study of hypokinetic and hypodynamic animal studies. It includes both American and foreign research papers. Author

N82-15710*# Research Triangle Inst., Research Triangle Park, N. C.
NASA BIOMEDICAL APPLICATIONS TEAM. APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE Quarterly Report, Apr. - Jun. 1979
D. J. Rouse, R. Beadles, H. C. Beall, J. N. Brown, Jr., W. H. Clingman, M. W. Courtney, M. McCartney, R. W. Scearce, and B. Wilson Jun. 1979 60 p refs
(Contract NAS1-14708)
(NASA-CR-152663; RTI/1411/00-07Q) Avail: NTIS HC A04/MF A01 CSCL 06C

The use of a bipolar donor-recipient model of medical technology transfer is presented. That methodology is designed to: (1) identify medical problems and aerospace technology that in combination constitute opportunities for successful medical products; (2) obtain the early participation of industry in the transfer process; and (3) obtain acceptance by the medical community of new medical products based on aerospace technology. Problem descriptions and activity reports and the results of a market study on the tissue freezing device are presented. E.A.K.

N82-15711*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
STS-1 MEDICAL REPORT
Sam L. Pool, ed., Philip C. Johnson, Jr., ed., and John A. Mason, ed. Dec. 1981 114 p
(NASA-TM-58240; S-509) Avail: NTIS HC A06/MF A01 CSCL 06P

The report includes a review of the health of the crew before, during and immediately after the first Shuttle orbital flight (April 12-14, 1981). Areas reviewed include: health evaluation, medical debriefing of crewmembers, health stabilization program, medical training, medical kit carried inflight; tests and countermeasures for space motion sickness, cardiovascular profile, biochemistry and endocrinology results; hematology and immunology analyses; medical microbiology; food and nutrition; potable water; shuttle toxicology; radiological health; cabin acoustical noise. Also included is information on: environmental effects of Shuttle launch and landing, medical information management; and management, planning and implementation of the medical program. For individual titles, see N82-15712 through N82-15731.

N82-15712*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVALUATION OF CREW HEALTH **c52**
Craig L. Fischer and Joseph Degioanni *In its* STS-1 Med. Rept. Dec. 1981 p 5-6 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

The STS-1 pre- and postflight medical evaluations are presented. Exams included: audiometry; dental examination; laboratory microbiology; physical examination; cardiovascular stress tests, including 80% treadmill; stand test weight; tonometry; and visual examination. No significant clinical problem was identified postflight. Of interest medically was the expected hyperreflexia and dependent venous stasis exhibited by both crewmen. T.M.

N82-15713*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
INFLIGHT OBSERVATIONS **c52**
Michael A. Berry *In its* STS-1 Med. Rept. Dec. 1981 p 7-9 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

The monitoring was carried out by recording electrocardiogram (ECG) during prelaunch, launch, early orbit time, entry, and landing; monitoring crew voice transmission throughout the mission; and conducting a daily private crew medical communication. Crew performance is outlined. No medical problems of any kind were experienced by the crew. No medical treatment inflight was required except for the prophylactic use of an antimotion sickness medication that had been planned preflight. T.M.

N82-15714*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW MEDICAL DEBRIEFING **c52**
Joseph Degioanni and Craig L. Fischer *In its* STS-1 Med. Rept. Dec. 1981 p 11-17 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

The postflight debriefings of the STS-1 astronauts are presented. The debriefings are presented as dialogues taken from the tape recording of the sessions. T.M.

N82-15715*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HEALTH STABILIZATION PROGRAM **c52**
James K. Ferguson *In its* STS-1 Med. Rept. Dec. 1981 p 19-21 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

The objective of the HSP is to provide an environment surrounding the prime and backup crewmen which will reduce or eliminate the exposure of the crew to infectious agents. The program limited the access of large numbers of newspersons to the crew and enabled the identification and medical examination of all VIP's who visited the crew. Although several primary contacts were observed not wearing masks at required times, the great majority of primary contacts did wear masks. The STS-1 program effectively kept 38 known ill persons out of crew work areas and thereby prevented crew exposure and possible illness. T.M.

N82-15716*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EMERGENCY MEDICAL SERVICES SYSTEM (EMSS) **c54**
Sam E. Pool *In its* STS-1 Med. Rept. Dec. 1981 p 23-27 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

The objective of the EMSS was to provide the ill or injured crewman with rapid access to the appropriate level of medical care. In order to meet the objective, the following factors were carefully considered in developing the EMSS for STS-1: accessibility to health care centers, personnel, training, experience, transportation, response times, communications, medical records, and special environmental hazards. The system is described along with flight surgeon staffing and deployment. T.M.

N82-15717*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW MEDICAL TRAINING **c52**
James M. Vanderploeg *In its* STS-1 Med. Rept. Dec. 1981 p 29-30 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

Each astronaut's initial training in the medical disciplines occurred during the first year following selection. The medical curriculum encompassed approximately 16 hours of instruction during the year. The principal areas covered include: the central and peripheral nervous systems; the auditory and vestibular systems; the visual system; dental health; the cardiovascular system; the pulmonary system, gastrointestinal system, and genitourinary system; and the musculoskeletal system. For each of these areas the astronauts were taught the basics of anatomy and physiology. In addition, they were introduced to physical examination techniques, diagnosis, and treatment of the more common ailments of the different organ systems. T.M.

N82-15718*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE ORBITAL MEDICAL SYSTEM **c52**
James M. Vanderploeg *In its* STS-1 Med. Rept. Dec. 1981 p 31-35 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

The system was designed to provide treatment for life threatening emergencies and to permit diagnosis and treatment of all less severe injuries and illnesses. It is intended to sustain the medical needs of a two man crew for up to 7 days. The system is described and a detailed list of the equipment in the emergency medical kit is presented. The prescribed medical training in the performance of emergency procedures, the use of diagnostic equipment, the performance of therapeutic modalities, and the knowledge of the medical kits contents is discussed. T.M.

N82-15719*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
VALIDATION OF PREDICTIVE TESTS AND COUNTERMEASURES FOR SPACE MOTION SICKNESS **c52**
Jerry L. Homick *In* the STS-1 Med. Rept. Dec. 1981 p 37-38 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

Inflight observations, supported by a series of pre and postflight data collection procedures, on STS-1 crewmembers in an effort to validate ground based tests which may be predictive of susceptibility to the space motion sickness syndrome are presented. Crew procedures were implemented which enabled acquisition of data to be used in validating motion sickness countermeasures. T.M.

N82-15720*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW CARDIOVASCULAR PROFILE **c52**
Michael W. Bungo *In its* STS-1 Med. Rept. Dec. 1981 p 39-45 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

Cardiovascular data was acquired in the operational mode of the flight. Heart rate and blood pressure responses are presented for each crewman. There were definable points in the mission which produce cardiovascular stress as measured by heart rate response. The stand test in both the PLT and CDR show evidence for a relative hypovolemia and perhaps a resetting of arterial regulation. The anti-G suit and G sub z acceleration effects are discussed. The anti-G suit proved to be a rather simple yet relatively effective device for increasing tolerance to +G sub z acceleration. The STS-1 flight profile produced no operationally significant alterations in G tolerance. T.M.

N82-15721*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BIOCHEMISTRY AND ENDOCRINOLOGY RESULTS **c52**
Carolyn S. Leach *In its* STS-1 Med. Rept. Dec. 1981 p 47-49 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

Blood (plasma or serum) biochemistry findings show postflight decreases below preflight findings for uric acid triglycerides, and AST. Postflight increases above preflight values were observed in glucose, cholesterol, BUN, calcium phosphate, angiotensin I, aldosterone, insulin, T3, T4, HGH, ACTH and GGTP. It is suggested that special attention should be given to the fluid and electrolyte intake in the astronauts so that homeostatic perturbations are not consequential. T.M.

N82-15722*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HEMATOLOGICAL AND IMMUNOLOGICAL ANALYSES **c52**
Gerald R. Taylor *In its* STS-1 Med. Rept. Dec. 1981 p 51-52 refs (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

The analyses conducted on the cellular blood components of the primary and backup crewmembers indicated that for the one month period preceding the flight, there were no unusual variations in the cellular blood components of the crewmembers. However, there were alterations in both of the primary crewmembers after the flight. The explanation is that there was a phase decrease in fluid volume. Concomitant with this fluid imbalance there is also evidence to support an absolute decrease in mean erythrocyte volume, a peripherial lymphopenia, and a marked decrease in blastogenic response of lymphocytes to in vitro mitogenic challenge. T.M.

N82-15723*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MEDICAL MICROBIOLOGY OF CREWMEMBERS **c52**
Duane L. Pierson *In its* STS-1 Med. Rept. Dec. 1981 p 53-58 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

A surveillance program consisting of microbial monitoring of the flight crews (prime and backup) and the spacecraft (including surfaces, food, air and water) is described. Samples were obtained from the crews and the Orbiter at specified times and were evaluated by quantitating the number of microorganisms and identifying the pathogenic and potentially pathogenic microbes. Quantitative values for total microorganisms per sample site were relatively low both pre- and postlaunch except for three sites which exhibited some microbial buildup during the flight. The circulating air in the Orbiter displayed a sharp increase in the number of airborne bacteria and fungi immediately prior to launch. T.M.

N82-15724*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FOOD AND NUTRITION **c54**
Richard L. Sauer and Rita M. Rapp *In its* STS-1 Med. Rept. Dec. 1981 p 59-62 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06H

The menu used during STS-1 is shown in terms of food items and food forms (irradiated, freeze-dried, or beverage). The estimated mean daily inflight nutrient consumption per crewman is presented. Recommended quantities of specific nutrients are reported. T.M.

N82-15725*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE POTABLE WATER **c54**
Richard L. Sauer *In its* STS-1 Med. Rept. Dec. 1981 p 63-66 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06K

Periodic samples of the potable water were obtained preflight and a series of samples were taken postflight to determine the continuing microbiological and chemical quality of the water. Those parameters of nonmedical concern which were exceeded included total organics and color. Other parameters included nickel concentration, total bacteria count, and chromium concentration levels. T.M.

N82-15726*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE TOXICOLOGY **c52**
Wayland J. Rippstein *In its* STS-1 Med. Rept. Dec. 1981 p 67-75 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06T

Space flight toxicity standards and methods for control and

evaluation of candidate spacecraft materials selection and/or use are described. The development of methods and hardware for removal of spacecraft contaminants is discussed. The analytical chemical data obtained from the two Orbiter vehicles (OV-101 and OV-102) were reviewed. The Enterprise (OV-101) is shown to be an extremely clean vehicle, whereas the Columbia (OV-102) outgassed a significant number and quantity of contaminant gases. T.M.

N82-15727*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
RADIOLOGICAL HEALTH c52
Charles M. Barnes *In its* STS-1 Med. Rept. Dec. 1981 p 77-78
(For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06R

Dosimeters were provided for development within the crew compartment and on the astronauts flight garments to detect radiation encountered by the space crew during the mission. The STS-1 mission encountered geomagnetically trapped electrons and protons on 13 low altitude passes through the South Atlantic anomaly. The orbital inclination was such that encounters with the outer belt horn was negligible. Radiation dose to the crew from the above events was estimated to be 5 millirad. Total PDL measured dose to the crew from all sources during the STS-1 mission was 20 millirad. T.M.

N82-15728*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CABIN ACOUSTICAL NOISE c71
Jerry L. Homick *In its* STS-1 Med. Rept. Dec. 1981 p 79-80
(For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 20A

Using a hand-held sound pressure level meter the crew made one octave band and A-weight sound level measurements at four locations in the Orbiter on Mission Day 1. The data were voice recorded and transmitted to the ground prior to the first inflight sleep period. The data obtained are summarized. From a physiological point of view the noise levels measured on STS-1 were not hazardous to the crewmens' hearing. T.M.

N82-15729*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ENVIRONMENTAL EFFECTS OF SHUTTLE LAUNCH AND LANDING c45
Andrew E. Potter *In its* STS-1 Med. Rept. Dec. 1981 p 81-91
(For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 13B

The areas of concern were the toxic exhaust cloud produced by Shuttle launch, the effect of launch operations on the local ecology, and the sonic boom produced by Orbiter re-entry. Wet acidic dust fell from the exhaust cloud for about ten minutes after launch. The fallout was not entirely unexpected, but the intensity and duration was larger than anticipated. The fallout material is not considered a significant health hazard. T.M.

N82-15730*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MEDICAL INFORMATION MANAGEMENT c82
Edward C. Moseley *In its* STS-1 Med. Rept. Dec. 1981 p 93-98
(For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 05B

Input forms were established for all areas of crew health assessment except microbiology. Microprocessor systems and remote terminals were functional for all medical laboratories and are described. The major objectives of being able to collect, store, and retrieve primary medical information from local and remote locations were accomplished. T.M.

N82-15731*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MANAGEMENT, PLANNING, AND IMPLEMENTATION OF MEDICAL OPERATIONS c81
Norman Belasco *In its* STS-1 Med. Rept. Dec. 1981 p 99-110
(For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 05A

The roles of the primary team member organization participating in and supporting STS-1 medical operations activities are summarized. The medical operations panel and supporting structure are outlined. The medical operations assignments are presented for JSC along with communications requirements for STS-1. T.M.

N82-15732# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany).
FEASIBILITY STUDY (PHASE A) FOR A LIFE SCIENCE DOUBLE RACK ENVISAGED FOR THE SPACELAB MISSION D1 Final Report, Oct. 1980
Rolf Baur, Karl-Ludwig Bitzer, Helmut Preiss, and Peter Schiller Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 83 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-037; ISSN-0170-1339) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17,40

The lifescience double rack which is envisaged for a flight in the Spacelab mission D1 enables the performance of biomedical and botanical experiments. Besides experiment specific boxes, the double rack contains multi-user facilities like a standard botanical equipment, an oscilloscope and two centrifuges, furthermore stowage containers for auxiliary equipment. For late access and early retrieval equipment, stowage lockers in the middeck are available and in addition middeck freezers can be used during flight. A concept for the life science double rack was worked out including the flight and ground operations and the ground support equipment. Author

N82-15733# Erno Raumfahrttechnik G.m.b.H., Bremen (West Germany).
CONCEPT STUDY OF A LIFE SCIENCES PAYLOAD ELEMENT (PLE) FOR THE SL-D1 MISSION Final Report, Nov. 1980
Peter Junk, Heinrich Stegen, Wolfgang Haebel, and Manfred Ott Bonn Bundesministerium fuer Forschung und Technologie Oct. 1981 184 p refs Partly in GERMAN and ENGLISH Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-038; ISSN-0170-1339) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 34,70

Twelve life sciences experiments were selected as candidates for the Spacelab (SL)-D1 mission. They are combined to form a payload element (PLE). Experiment requirements were analyzed and completed, and technical concepts for the PLE were proposed. Interfaces were defined and missions assurance, operational, testing, and ground support aspects were considered. Most of the experiment requirements are within the capability which is supplied by the Space Transportation System, except the total stowage volume required for sample stowage in the orbiter mid deck. Also crew time is a critical parameter. The technical design concepts of the experiments are based on first Spacelab payload hardware or on existing commercial equipment, which has to be modified for SL. For realizing the SL-PLE, 32 months were estimated, starting from a definition phase. M.G.

N82-15734# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radizioni.
SPECTROPHOTOMETRIC STUDIES ON THE RNA STRUCTURE IN E.COLI RIBOSOMES. PART 1: FUNDAMENTALS OF ULTRAVIOLET SPECTROPHOTOMETRY OF NUCLEI ACIDS
M. Belli, F. Mazzei, and G. Onori (Perugia Univ., Italy) 20 Mar. 1980 35 p refs In ITALIAN; ENGLISH summary 2 Vol.
(ISS-R-80/2-Pt-1; ISSN-0390-6477) Avail: NTIS HC A03/MF A01

The fundamentals of UV absorption spectroscopy of nucleic acids are reviewed. The relationship between the absorption of a polymer (DNA, RNA) with the absorption properties of the bases, is described. The association between spectral changes and structural modifications in nucleic acids, is also evidentiated. M.G.

N82-15735# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.
SPECTROPHOTOMETRIC STUDIES OF THE RNA STRUCTURE IN E.COLI RIBOSOMES. PART 2: INFLUENCE OF IONS AND PROTEINS ON THE RNA SECONDARY STRUCTURE

A. Araco, M. Belli, F. Mazzei (Perugia Univ.), and G. Onori 27 Mar. 1980 31 p refs In ITALIAN; ENGLISH summary 2 Vol. (ISS-R-80/3-Pt-2; ISSN-0390-6477) Avail: NTIS HC A03/MF A01

The main results obtained on E.coli ribosomes and rRNA conformation are reviewed. It is shown in particular that the rRNA structure within the ribosome subunits can be affected by the interaction with proteins and with magnesium. M.G.

N82-15736# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FUNDAMENTALS OF AERONAUTICAL AND AEROSPACE MEDICAL SCIENCE

Cai Qiao, Feng Genquan, and Yan Yuanfu 17 Jul. 1981 956 p Transl. into ENGLISH of the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 344 p

(AD-A102298; FTD-ID(RS)T-1802-80) Avail: NTIS HC A99/MF A01 CSCL 06/5

The biological and physiological effects of flight environments were examined along with the types of environments themselves. The environments discussed are of three major types: the external environment, the cabin environment, and the internal environment of the body. Emphasis is placed on acceleration stresses and high gravity environments, flight safety and health, and the human body's reaction to the particular stresses discussed. For individual titles, see N82-15737 through N82-15762.

N82-15737# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE DEVELOPMENTAL HISTORY OF AERONAUTICAL AND AEROSPACE MEDICAL SCIENCE c52

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 4-8 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Early research is emphasized. Several experiments in balloon flight and pressurized cabins are discussed. Problems arising from aeronautical development in World War 1 such as frostbite, hypoxia, decompression sickness, and flight fatigue are discussed. The influences of space navigational development on aerospace medicine are also discussed. The relationship between aircraft flight environment and spacecraft environment is considered. T.M.

N82-15738# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

ENVIRONMENTAL CONDITIONS OF AVIATION AND SPACE NAVIGATION c54

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 9-24 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-52)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Three types of environments are discussed: the space environment, the inner cabin environment, and the environment in the human body. Atmospheric conditions encountered in aviation and space flight were reviewed. Medically related aircraft and spacecraft environmental conditions are summarized and include low pressure, lack of oxygen, decompression, explosive decompression, and oxygen poisoning. T.M.

N82-15739# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

GENERAL LAWS OF AVIATION AND SPACE NAVIGATION ENVIRONMENTAL EFFECTS ON THE HUMAN BODY c52

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 25-34 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

The effects of environmental conditions on the human body are brought about within various complex relations. The so-called action of a single condition is only the most outstanding manifestation in a certain dynamic process. The physiological changes and pathological process of the human body in space navigation as well as their reasons and reaction mechanisms were analyzed. The following factors are discussed: the qualities and composition of the environmental factors; the functioning state of the organism at the time; and man's subjective dynamic role. T.M.

N82-15740# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MEDICAL PROBLEMS OF GRAVITATIONAL CHANGES AND POWERED FLIGHT c52

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 35-37 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Three types of gravitational change are discussed: overweightness, angular acceleration, and noise produced by air vibration. Overweightness is considered as a large increase in the gravitational force such as impact. The vestibule-autonomic nervous system reactions and motion sickness caused by angular acceleration are covered. Aerodynamic noise tolerances are discussed. T.M.

N82-15741# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

INJURY AND PROTECTION OF OVERWEIGHTNESS c54

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 38-129 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Physiological acceleration and acceleration stresses are summarized. Acceleration protection in high gravity environments is emphasized. The physics of angular acceleration and impact acceleration were reviewed. The physiological effects of high gravity are presented in detail along with pilot performance results due to such stresses. T.M.

N82-15742# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

HARMFULNESS OF VIOLENT IMPACT AND AIRFLOW SHOCKS c52

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 131-162 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Various types of impact on the human body resulting from aircraft accidents or sudden deceleration are discussed. Special emphasis is given to parachuting or ejection from the aircraft and protective measures to be taken. L.F.M.

N82-15743# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

HUMAN BODY REACTION TO VIBRATION c52

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-08) 17 Jul. 1981 p 163 223 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Low frequency whole body vibrations sustained in aircraft and spacecraft are discussed. The physiological effects of such vibrations and protective measures to be taken are presented. L.F.M.

N82-15744# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE EFFECTS OF ROTATION AND OSCILLATION: AERIAL SICKNESS **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 195-223 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Aerial sickness caused by aircraft and spacecraft motion is discussed. Various motion sickness drugs and other measures for combating this sickness are presented. L.F.M.

N82-15745# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

FLIGHT ILLUSIONS **c54**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 224-295 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Flight illusions encountered by aircraft pilots are discussed. Pilot selection and training techniques as well as other measures for preventing and overcoming these illusions are presented. L.F.M.

N82-15746# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

MAN'S ADAPTATION TO WEIGHTLESSNESS AND LOW WEIGHT **c54**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ED(RS)T-1802-80) 17 Jul. 1981 p 244-295 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Weightlessness and its effect on astronauts after long exposure to it are discussed. Its causes and various means to combat it are presented. L.F.M.

N82-15747# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

NOISE AND SENSE OF HEARING **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 296-335 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Aircraft noise and its effect on pilots and others of the crew are discussed. Noise reduction techniques and steps to be taken to allow pilot efficiency in a noisy environment are presented. L.F.M.

N82-15748# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE PHYSIOLOGICAL EFFECT OF LOW-AIR-PRESSURE ANOXIA **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 337-398 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Anoxia, a problem of the atmospheric environment in aerospace medicine, is discussed extensively. Discussion is limited to the physiological effects of anoxia caused by low air pressure. More specifically, the effects on the human respiratory, circulatory, nervous, and metabolic systems are detailed. M.D.K.

N82-15749# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CAISSON DISEASE **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 398-426 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

The causal factors of Caisson Disease, a problem of the atmospheric environment in aerospace medicine, are discussed. Physiological effects of the disease on the human respiratory, circulatory, digestive, and skeletal systems are considered. Effects on body organs and tissues and attendant shock and fainting are also discussed. The physiological effects (mechanical and biochemical) of the formation of bubbles inside body tissues, the main cause of Caisson Disease, are detailed. Pressurization treatment and suggested procedures for adaptation and training as preventative measures are also discussed. M.D.K.

N82-15750# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

DANGERS OF EXPLOSIVE DECOMPRESSION **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 427-439 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Explosive decompression, drastic decompression at an ascent rate of over 1.5 km/sec, in space ships is either caused by structural damage or collision with a large meteor. The physiological effects of explosive decompression, a problem of the atmospheric environment in aerospace medicine, are discussed. Specific effects on the physiological tolerances of the human respiratory (bubble formation), digestive, nervous, and circulatory systems and attendant effects on body organs are considered. Suggestions for developing adaptation, training, and preventative methodology to handle explosive decompression are given. M.D.K.

N82-15751# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OXYGEN TOXICATION **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) p 440-456 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Oxygen poisoning, oxygen toxication, will be induced if the oxygen partial pressure is over 176 mm Hg and the duration is too long. The physiological effects of oxygen poisoning, a problem of the atmospheric environment in aerospace medicine, is discussed. Effects on the human respiratory and circulatory systems, hearing and vision, and body tissues are considered. Suggestions for fire prevention, safety measures, and protective equipment for use in pure oxygen environments are given. M.D.K.

N82-15752# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE RELATIONSHIP OF BODY TEMPERATURE TO ENVIRONMENTAL TEMPERATURE **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 457-476 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

The unresolved problem of fluctuations in environmental temperature in aeronautics and space travel and the attendant physiological effects on the human body are considered. Environmental temperature requirements, namely optimal and tolerable temperatures, the damage done to the human body by

cold and heat, and its prevention are discussed. The human body's inherent mechanisms and their responses in regulating normal body temperature are also reviewed. M.D.K.

N82-15753# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

COMFORTABLE TEMPERATURE AND TOLERABLE TEMPERATURE **c54**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 477-506 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

The range of temperature during flight which makes people feel comfortable was examined. During passenger flights or space travel, the cabin temperature is kept in a range comfortable for the crew and passengers. However, this comfortable temperature range cannot always be maintained. Flighters always have to sacrifice comfort for speed, any complicated temperature regulation facilities adds extra weight and volume to the plane, and slow it down. The comfortable temperature range required to maintain flying ability and operational efficiency is the acceptable temperature. The comfortable, tolerable and acceptable temperatures are discussed. E.A.K.

N82-15754# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE PHYSIOLOGICAL EFFECT OF HEAT AND ITS PREVENTION **c52**

In its Fundamentals of Aeron. and Aerospace Med Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 507-534 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

The actual physiological effects of heat and preventive measures are discussed. The following issues are examined: (1) change of skin temperature and internal body temperature; (2) perspiration rate; (3) change of cardiovascular systems, respiration, and metabolism; (4) effects of heat; (5) sensitivity to temperature; (6) heat stroke; (7) heat adaptation; (8) heat damage prevention. E.A.K.

N82-15755# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

THE EFFECT OF COLD AND THE COLD PREVENTION **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 535-554 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

The effects of cold, and cold prevention are described. Physiological responses to low temperatures are outlined: (1) physiological effects and damaged of cold; (2) local frostbites and injuries caused by cold; (3) effects of cold on flying ability; (4) factors affecting physiological responses to cold; (5) adaptation to cold; (6) clothing. E.A.K.

N82-15756# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

IONIZING RADIATION AND ITS BIOLOGICAL EFFECTS **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 555-630 Transl. into ENGLISH from "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

The biological effects of ionizing radiation are outlined. The following issues are discussed: (1) units of ionizing radiation; (2) radiation environments in space travel (solar cosmic radiation, terrestrial radiation zones); (3) radiation intensity during air and space travel (cosmic radiation in supersonic jets); (4) mechanism of radiation biological effects; (5) biological target theory; (6) radiation damage; (7) limitations of radiation safety. E.A.K.

N82-15757# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OTHER BIOLOGICAL EFFECTS OF RADIATION **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 631-707 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

The application of lasers in aerospace technology, its biological effects, and protective measures are discussed. The light simulated radiation has special characteristics of collimation and coherency, and its light pressure and destructive power is much greater than common light. Various types of lasers are solid gas, chemical, semiconductor and their light waves which have several thousand different wavelengths from ultraviolet to infrared. The use of laser technology in industrial health, and scientific research, and its use in military affairs and national defense is outlined. In the military, lasers have not only become effective measures in communications, aiming, reconnaissance, observations, night vision and navigation, but they can also be used directly as deadly weapons. E.A.K.

N82-15758# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

VISUAL PROBLEMS IN AVIATION AND SPACE NAVIGATION **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) p 708-739 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Visual problems encountered on aerospace navigation are discussed. Vision depends on the stimulation of visible light for realization and visible light is a type of electromagnetic radiation. The wavelength of visible light is 3,800-7,500 angstrom and photon energy lies in the range of 3.1-16.5 electron volts. After entering a high altitude or outer space, many differences occur between the visual environment and the Earth's surface, presenting aerospace medical science with many special problems concerning vision. E.A.K.

N82-15759# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

SPACE NAVIGATION LIFE QUARANTEES **c52**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 740-822 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)

Avail: NTIS HC A99/MF A01 CSCL 06/5

Requirements for and the provision of a normal living environment and the necessary supplies of food, water, gases, and hygenic and medical safequards during space flight are discussed. The human metabolism is reviewed. Food supply and preparation methods, oxygen supply and methods of handling waste gases, the water supply and water regeneration, closed life support systems and subsystems and environmental sanitation are described. Space suit and helmet design are considered. Medical treatment and first aid, the medical experiences of the Apollo astronauts, and emergency requirements for forced landing on Earth in desert, ocean, and polar regions and the basic survival kit are discussed. The biological clock and diurnal rhythm are considered. J.D.H.

N82-15760# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

CABIN POLLUTION **c54**

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 822-873 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense

Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

Possible pollutants existing in closed aircraft and spacecraft cabins and methods for the handling and disposal of these pollutants are described. Pollutants from fuel, waste gases, and rubber articles are considered. Excretions from the human body including gases, perspiration, feces, urine, and gastrointestinal tract gases are also sources of pollution. Pollutants originating from high altitudes and outer space, such as high altitude ozone and cosmic space radiation, are considered. J.D.H.

N82-15761# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AVIATION MEDICAL GUARANTEES c52
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 874-889 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

The medical requirements for pilots and air crew and how to guarantee their safety, work capabilities, and physical health in the air are discussed. The various characteristics of flight work are described. Psychological and physical preparation of air crews for flight stress are considered. J.D.H.

N82-15762# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SPACE NAVIGATION MEDICAL GUARANTEES AND MEDICAL SUPERVISION c52
In its Fundamental of Aeron. and Aerospace Med. Sci. (FTD-ID(RS) T-1802-80) 17 Jul. 1981 p 890-919 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

The medical requirements for astronauts and how to guarantee their safety, work capabilities, and physical health during space flight are discussed. The characteristics of flight work are described. Psychological and physical preparation of astronauts for flight stress are considered. Special consideration is given to the medical selection of astronauts and the medical guarantees and supervision required during training, and prior to, during, and after space flight. J.D.H.

N82-15763# Joint Publications Research Service, Arlington, Va.
USSR REPORT: LIFE SCIENCES BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 13
10 Dec. 1981 89 p refs Transl. into ENGLISH from various Russian articles
(JPRS-79639) Copyright. Avail: Issuing Activity

The fouling of metals and petroleum products by anaerobes, the production of synthetic proteins from biomass, the development of virus-resistant varieties of plants, and general epidemiology and prophylaxis for infectious diseases are among the topics covered in this review of progress studied in the areas of biochemistry, medical science, radiation biology, and ecosystems. For individual titles, see N82-15764 through N82-15767.

N82-15764# Joint Publications Research Service, Arlington, Va.
MICROBIOLOGIC ASPECTS OF METAL CORROSION c26
Ye. I. Andreyuk and I. A. Kozlova *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 1-9 refs Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 139-145 (For primary document see N82-15763 06-51)
Avail: Issuing Activity

Data are presented on the role of microorganisms in the corrosion of metals and metallic structures which are used in different ecological conditions. Mechanisms of anaerobic and aerobic corrosion caused by bacteria in the sulfur cycle are examined. Author

N82-15765# Joint Publications Research Service, Arlington, Va.
ALL-UNION CONFERENCE ON NEW SOURCES OF FOOD PROTEIN AND THEIR APPLICATION c54
L. A. Zakordonets *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 10-12 Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 266-267 Conf. held in Tbilisi, USSR, Nov. 1980 (For primary document see N82-15763 06-51)
Avail: Issuing Activity

Highlights are given of reports presented on general questions concerning the processing of protein, obtaining protein from animal and plant sources, using protein from new sources derived from meat products, dairy products, bread-making and the canning industry. A.R.H.

N82-15766# Joint Publications Research Service, Arlington, Va.
ECOLOGICAL AND TECHNOLOGICAL PROBLEM OF BIODAMAGES
I. A. Kozlova and E. Z. Koval *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 13-15 Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 267-268 (For primary document see N82-15763 06-51)
Avail: Issuing Activity

The problem of biodamages is the ecological-technical problem of modern times, encompassing a wide circle of questions related to the study of organism-destruction from microorganisms, rodents and birds which cause damage to an enormous number of materials, resources, products and equipment and the need to develop means for protection from bioovergrowth, biodamage and biocorrosion. Topics discussed in 15 scientific reports on new directions in research on this global problem are summarized. A.R.H.

N82-15767# Joint Publications Research Service, Arlington, Va.
CONFERENCE ON PLANT VIROLOGY
V. G. Krayev *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 16-18 Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 269-270 (For primary document see N82-15763 06-51)
Avail: Issuing Activity

The basic diseases affecting agricultural ornamental plants in Poland and efforts to identify new viruses and produce resistant varieties of farm crops were reviewed in a conference attended by 70 scientists from 7 countries. Other topics discussed include: (1) the influence of viral diseases of plants and animals on food products and the productivity of livestock; (2) methods for diagnosing viral diseases and their comparative effectiveness; (3) characteristics of new viruses, strains, and isolates of plant viruses in various countries and their distribution in the seeding of cultured plants such as alfalfa, potatoes, peanuts, tomatoes, cucumbers, tabacco, and raspberries; (4) the epidemiology of viral diseases and practical means of combatting them; and (5) advances in photovirology. A.R.H.

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N82-15768* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY. A CONTINUING BIBLIOGRAPHY WITH INDEXES (SUPPLEMENT 225)
Nov. 1981 59 p
(NASA-SP-7011(225)) Avail: NTIS HC $7.00 CSCL 06E

This bibliography lists 140 reports, articles, and other documents introduced into the NASA scientific and technical information system in October 1981. E.A.K.

N82-15769*# Research Triangle Inst., Research Triangle Park, N. C.

APPLICATIONS OF AEROSPACE TECHNOLOGY IN BIOLOGY AND MEDICINE

H. C. Beall, R. L. Beadles, J. N. Brown, Jr., W. H. Clingman, M. W. Courtney, D. J. Rouse, and R. W. Scearce, Jr. Hampton, Va. NASA Jul. 1979 128 p refs
(Contract NAS1-14708)
(NASA-CR-159106; RTI/1411/00-05F) Avail: NTIS HC A07/MF A01 CSCL 06B

Medical products utilizing and incorporating aerospace technology were studied. A bipolar donor-recipient model for medical transfer is presented. The model is designed to: (1) identify medical problems and aerospace technology which constitute opportunities for successful medical products; (2) obtain early participation of industry in the transfer process; and (3) obtain acceptance by medical community of new medical products based on aerospace technology. E.A.K.

N82-15770*# Wisconsin Univ. - Madison.

NASA BIOMEDICAL APPLICATIONS TEAM ADVISORY CENTER FOR MEDICAL TECHNOLOGY AND SYSTEMS Final Report

Melvin P. Siedband 28 May 1981 29 p refs
(Contract NAS5-26454)
(NASA-CR-166755) Avail: NTIS HC A03/MF A01 CSCL 06B

Projects carried out by the UW-BATeam are reported. The following subjects were investigated: clinical opthalmic ultrasound improvements, magnetic cell sorters, hyperthermia treatment for cancer, joystick driving control for the handicapped, qualitative coronary artery imaging (MIPS), and speech autocuers. E.A.K.

N82-15771# Naval Ocean Systems Center, San Diego, Calif. Bioengineering Branch.

REMOTE MEDICAL DIAGNOSIS SYSTEM (RMDS) UTILIZATION STUDY Technical Progress Report, Dec. 1980 - May 1981

I. Stevens and C. Zekan (WESTEC Services, Inc.) 18 Aug. 1981 44 p refs
(Contract N00123-81-D-0353)
(AD-A105559; NOSC-TR-700) Avail: NTIS HC A03/MF A01 CSCL 06/5

Remote medical diagnosis systems are being successfully utilized for consultation in rural health care programs and private radiology practices. Consultation over RMDS-type systems reduces medical referrals and evaluations and assists in making triage decisions with a greater degree of confidence. RMDS-type systems can be used effectively for teleradiology consultations. The utilization of RMDS on ships and at remote shore sites has the potential for improved diagnoses. Nonphysician health care providers are more inclined to use telemedicine than physicians. GRA

N82-15772# Brookhaven National Lab., Upton, N. Y. Medical Research Center.

APPLICATIONS OF NUCLEAR TECHNIQUES FOR IN VIVO BODY COMPOSITION STUDIES AT BROOKHAVEN NATIONAL LABORATORY

S. H. Cohn, K. J. Ellis, D. Vartsky, A. N. Vaswani, and L. Wielopolski 1981 42 p refs Presented at the IAEA Conf. on Nucl. Based Tech. for In Vivo Study of Human Body Composition, Upton, N.Y., 22 Jun. 1981
(Contract DE-AC02-76CH-00016)
(DE81-029922; BNL-29959; CONF-8106151-1) Avail: NTIS HC A03/MF A01

A series of technical developments and their clinical application in various nuclear technologies is described. These include the development of a portable neutron activation facility for measuring cadmium in vivo in kidney and liver, a technique for the measurement of body iron utilizing nuclear resonant scattering of gamma rays, a noninvasive measure of the skeletal levels of lead by an X-ray fluorescence technique, and the development of a pulsed Van de Graaff generator as a source of pulsed neutrons for the measurement of lung silicon. DOE

N82-15773# Massachusetts Inst. of Tech., Cambridge.

MYOCARDIAL PERFUSION SCINTIGRAPHY USING A NEW TECHNIQUE, THE MESH CHAMBER Progress Report, 1 Sep. 1978 - 1 May 1981

Louis S. Osborne and B. Leonard Holman Aug. 1981 16 p Prepared in cooperation with Harvard Medical School
(Contract DE-AS02-78EV-04969)
(DE81-027995; DOE/EV-04969/3) Avail: NTIS HC A02/MF A01

Myocardial perfusion scintigraphy performed after the injection of a potassium analogue during exercise to detect transiently ischemic myocardium due to coronary artery disease was examined. The limitation in the implementation of the technique for the screening of patients with coronary artery disease is the lack of a high resolution, positron detecting system. The positron multiwire proportional counter solves this problem. The dispersion of the absorbing material is achieved by stringing wires of high Z material, such as tungsten, in a cross pattern. The wire layers are at graded voltages, the ionization from the photoelectrons is drifted through the stack and picked up by sense wires operating in the proportional mode. Positron annihilation detectors are self collimating. The acquisition of events over a multiplicity of angles allows 3 dimensional reconstruction. The combination of large solid angle, high efficiency and a short source half life minimizes radiation dose to the patient. DOE

N82-15774# Pacific Northwest Lab., Richland, Wash.

PROBLEMS IN EVALUATING HEALTH EFFECTS OF OCCUPATIONAL AND ENVIRONMENTAL EXPOSURES

Ethel S. Gilbert 1981 23 p refs Presented at the Conf. on Statistical and Epidemiological Methods in Ionizing Radiation, Berkeley Springs, W. Va., 6-10 Jul. 1981
(Contract DE-AC06-76RL-01830)
(DE81-028440; PNL-SA-9632; CONF-810755-1) Avail: NTIS HC A02/MF A01

The problems involved in analyzing and interpreting radiation exposure data are addressed. Existing standards for exposure are based primarily on estimates of health effects obtained by extrapolation from effects of high level exposures. Occupational and environmental exposures provide one source of data. Populations exposed in this manner were studied. Because of the size of most of the groups and the magnitude of the exposures received the amount that can be learned from such populations is severely limited. Many of these problems are illustrated by study of the effects on mortality of occupational exposure to radiation at the Hanford plant. DOE

N82-15775# Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.

AIRBORNE ULTRASOUND: MEASUREMENT AND POSSIBLE ADVERSE EFFECTS

Bruce A. Herman and David Powell May 1981 19 p refs Prepared in cooperation with Rensselaer Polytechnic Inst., Troy, N.Y.
(PB81-240459; DHHS/PUB/FDA-81-8163) Avail: NTIS MF A01; SOD HC CSCL 06R

Ultrasound energy in the range of 16 kHz to 100 kHz which is used in a variety of consumer and industrial applications is discussed. For consumer devices the intended transmitting medium is usually air while industrial processes usually use liquid or solid materials as propagating media. In the latter situation attendant acoustic energy is radiated into the surrounding atmosphere. GRA

N82-15776# Colorado Univ., Denver. Health Sciences Center.

NON-INVASIVE PULMONARY ARTERIAL PRESSURE MEASUREMENT Final Report, 1 Jun. 1976 - 30 Nov. 1980

John T. Reeves 8 Jun. 1981 124 p
(Contract NO1-HR-6-2920)
(PB81-239410; NIH-NO1-HR-62920-1F) Avail: NTIS HC A06/MF A01 CSCL 06P

Pulmonary arterial pressure by noninvasive means based on measurement of hemodynamic variables, particularly pulse wave velocity, instantaneous blood flow and pulmonary arterial diameter was measured. An esophageal approach showed good pulmonary arterial flow patterns from the esophagus. A dual range gated Doppler from the front obtained Doppler flow pulses in the main pulmonary artery. A body plethysmographic technique recorded flow at the most distal part of the pulmonary vascular bed, the microcirculation. In humans undergoing right heart catheterization,

pulse wave velocity was an excellent correlation of pressure in the low range. It is suggested that the scator at higher pressures is due to variations in artery diameter and wall stiffness. It is concluded that a hemodynamic approach is feasible using known techniques if the problem of measuring pulse wave velocity can be solved. GRA

N82-15777# National Bureau of Standards, Washington, D.C. National Engineering Lab.
A HEAT TRANSFER ANALYSIS OF SCALD INJURY Final Report
Robert L. Palla, Jr. Jul. 1981 69 p refs
(PB81-238503; NBSIR-81-2320) Avail: NTIS HC A04/MF A01 CSCL 06E

Numerical solutions for skin tissues temperature during scald injury events are obtained and utilized in conjunction with a thermal injury criterion, to predict critical exposure levels for various heated fluids. A one dimensional tissue model of the type used by Love is employed to determine the initial tissue temperature distribution. The bio-heat equation for tissue heat transfer is then solved via an implicit finite difference technique, subject to convective heating and cooling at the surface. The sensitivity of the critical exposure level to variation in tissue properties and convective heating coefficients is investigated. Thermal injury thresholds are presented for various fluids along with bounds to reflect uncertainty in assumed tissue properties. The results obtained are in good agreement with existing experimental scald injury data. GRA

N82-15778# National Inst. on Drug Abuse, Rockville, Md. Div. of Research.
NEW APPROACHES TO TREATMENT OF CHRONIC PAIN: A REVIEW OF MULTIDISCIPLINARY PAIN CLINICS AND PAIN CENTERS
Lorenz K. Y. Ng, ed. May 1981 212 p refs Presented at a Conf. held at Bethesda, Md., 20-21 Jun. 1980
(Contract NIDA-271-79-3607)
(PB81-240913; DHHS/PUB/ADM-81-1089; NIDA/DR081-03; LC-81-600060; NIDA/RM-36) Avail: NTIS HC A10/MF A01 CSCL 06E

Chronic pain treatment is discussed including multidisciplinary pain clinics and centers and their staffing and organization, the problems for which patients are treated, drugs taken by entering patients, therapeutic approaches used, costs of treatment, and methods for long-term evaluation of treatment effectiveness. Goals for future research and professional and public education are also presented. GRA

N82-15712*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVALUATION OF CREW HEALTH
Craig L. Fischer and Joseph Degioanni *In its* STS-1 Med. Rept. Dec. 1981 p 5-6 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

N82-15713*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
INFLIGHT OBSERVATIONS
Michael A. Berry *In its* STS-1 Med. Rept. Dec. 1981 p 7-9 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

N82-15714*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW MEDICAL DEBRIEFING
Joseph Degioanni and Craig L. Fischer *In its* STS-1 Med. Rept. Dec. 1981 p 11-17 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

N82-15715*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HEALTH STABILIZATION PROGRAM
James K. Ferguson *In its* STS-1 Med. Rept. Dec. 1981 p 19-21 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

N82-15717*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW MEDICAL TRAINING
James M. Vanderploeg *In its* STS-1 Med. Rept. Dec. 1981 p 29-30 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

N82-15718*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE ORBITAL MEDICAL SYSTEM
James M. Vanderploeg *In its* STS-1 Med. Rept. Dec. 1981 p 31-35 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

N82-15719*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
VALIDATION OF PREDICTIVE TESTS AND COUNTERMEASURES FOR SPACE MOTION SICKNESS
Jerry L. Homick *In* the STS-1 Med. Rept. Dec. 1981 p 37-38 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

N82-15720*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CREW CARDIOVASCULAR PROFILE
Michael W. Bungo *In its* STS-1 Med. Rept. Dec. 1981 p 39-45 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

N82-15721*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BIOCHEMISTRY AND ENDOCRINOLOGY RESULTS
Carolyn S. Leach *In its* STS-1 Med. Rept. Dec. 1981 p 47-49 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

N82-15722*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
HEMATOLOGICAL AND IMMUNOLOGICAL ANALYSES
Gerald R. Taylor *In its* STS-1 Med. Rept. Dec. 1981 p 51-52 refs (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06P

N82-15723*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MEDICAL MICROBIOLOGY OF CREWMEMBERS
Duane L. Pierson *In its* STS-1 Med. Rept. Dec. 1981 p 53-58 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

N82-15726*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SHUTTLE TOXICOLOGY
Wayland J. Rippstein *In its* STS-1 Med. Rept. Dec. 1981 p 67-75 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06T

N82-15727*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
RADIOLOGICAL HEALTH
Charles M. Barnes *In its* STS-1 Med. Rept. Dec. 1981 p 77-78 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06R

N82-15737# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE DEVELOPMENTAL HISTORY OF AERONAUTICAL AND AEROSPACE MEDICAL SCIENCE
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 4-8 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15739# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
GENERAL LAWS OF AVIATION AND SPACE NAVIGATION ENVIRONMENTAL EFFECTS ON THE HUMAN BODY

In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 25-34 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15740# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MEDICAL PROBLEMS OF GRAVITATIONAL CHANGES AND POWERED FLIGHT
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 35-37 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15742# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HARMFULNESS OF VIOLENT IMPACT AND AIRFLOW SHOCKS
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 131-162 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15743# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
HUMAN BODY REACTION TO VIBRATION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-08) 17 Jul. 1981 p 163 223 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15744# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE EFFECTS OF ROTATION AND OSCILLATION: AERIAL SICKNESS
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 195-223 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15747# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
NOISE AND SENSE OF HEARING
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 296-335 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15748# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE PHYSIOLOGICAL EFFECT OF LOW-AIR-PRESSURE ANOXIA
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 337-398 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15749# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CAISSON DISEASE
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 398-426 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15750# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
DANGERS OF EXPLOSIVE DECOMPRESSION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 427-439 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15751# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
OXYGEN TOXICATION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) p 440-456 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15752# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE RELATIONSHIP OF BODY TEMPERATURE TO ENVIRONMENTAL TEMPERATURE
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 457-476 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15754# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE PHYSIOLOGICAL EFFECT OF HEAT AND ITS PREVENTION
In its Fundamentals of Aeron. and Aerospace Med Sci. (FTD-ID (RS)T-1802-80) 17 Jul. 1981 p 507-534 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15755# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
THE EFFECT OF COLD AND THE COLD PREVENTION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 535-554 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15756# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
IONIZING RADIATION AND ITS BIOLOGICAL EFFECTS
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 555-630 Transl. into ENGLISH from "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15757# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

OTHER BIOLOGICAL EFFECTS OF RADIATION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 631-707 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15758# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
VISUAL PROBLEMS IN AVIATION AND SPACE NAVIGATION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) p 708-739 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15759# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SPACE NAVIGATION LIFE QUARANTEES
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 740-822 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15761# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
AVIATION MEDICAL GUARANTEES
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 874-889 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15762# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SPACE NAVIGATION MEDICAL GUARANTEES AND MEDICAL SUPERVISION
In its Fundamental of Aeron. and Aerospace Med. Sci. (FTD-ID(RS) T-1802-80) 17 Jul. 1981 p 890-919 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N82-15779# Assessment Systems Corp., St. Paul, Minn.
METHODS FOR LINKING ITEM PARAMETERS Final Report
C. David Vale, Vincent A. Maurelli, Kathleen A. Gialluca, David J. Weiss, and Malcolm James Ree Brooks AFB, Tex. AFHRL Aug. 1981 190 p refs
(Contract F33615-80-C-0008)
(AD-A105509; AFHRL-TR-81-10) Avail: NTIS HC A09/MF A01 CSCL 05/9

A simulation study to determine appropriate linking methods for adaptive testing items was designed. Responses of examinees of three group sizes for four test lengths were simulated. Three basic data sets were created: (a) randomly sampled data set, (b) systematically sampled data set, and (c) selected data set. Three categories of evaluative criteria were used: fidelity of parameter estimation, asymptotic ability estimates, root-mean-square error of estimates, and the correlation between true and estimated ability. Test length appeared to be relatively more important to calibration effectiveness than was sample size, efficiency analyses suggested that increases in test length were at least three to four times as effective in improving calibration efficiency as proportionate increases in calibration sample sizes. The asymptotic ability analyses suggested that the linking procedures based on Bayesian ability estimation (an equivalent-groups procedure) were somewhat more effective than the others and that the equivalent-tests method was typically no better than not linking at all. Analyses using the relative efficiency criteria suggested that the equivalent-groups procedures were superior to the equivalent-tests procedures and that those using Bayesian scoring procedures were slightly superior to the others tested. Efficiency loss due to linking error was always less than that due to item calibration error and although test length and sample size had a definite effect on calibration efficiency, no strong effects appear with respect to linking efficiency. For the systematically sampled data set, the anchor-test and anchor-group methods were considered along with the equivalence methods.
GRA

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N82-15780*# Life Systems, Inc., Cleveland, Ohio.
PREPROTOTYPE NITROGEN SUPPLY SUBSYSTEM DEVELOPMENT Interim Report, Jun. 1981
D. B. Heppner, T. M. Hallick, and F. H. Schubert Jun. 1981 50 p refs
(Contract NAS2-10673)
(NASA-CR-166192; LSI-TR-410-4) Avail: NTIS HC A03/MF A01 CSCL 06K

A nitrogen supply subsystem based on the dissociation of hydrazine into a mixture of hydrogen and nitrogen is developed. The latter is separated to provide makeup nitrogen to control the composition of spacecraft atmospheres. Specific hardware developments resulted in the design and fabrication of a nominal 3.6 kg/d nitrogen generation module. The design integrates a hydrazine catalytic dissociator, three ammonia dissociation stages and four hydrogen separation stages into a 33 kg, 14 cu dm module. A technique was devised to alternate the ammonia dissociation and hydrogen separation stages to give high nitrogen purity in the end product stream. Tests show the product stream to contain less than 0.5 percent hydrogen and 10 parts per million ammonia. The design and development of a test stand for the nitrogen generation module and a series of tests which verified its operation and performance capability are described.
S.L.

N82-15781# Luitpoldhuette A.G., Amberg (West Germany).
HUMANIZATION OF WORKING PLACES IN THE FOUNDRY BY USE OF AN AUTOMATIC FETTLING EQUIPMENT Final Report
Hanns Helge Bolle Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 64 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-81-004; ISSN-0171-7618) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 13.40

Operation of a pilot plant using an industrial robot in the fettling shop of a foundry is described. A continuous path 5 axis robot was employed to steer the pneumatic grinding equipment while the castings remained in a fixed position. Satisfactory removal of edges from the castings was achieved. Ergonomic analysis revealed a reduction of stress for human workers in the foundry. Problems encountered require an automatic change of tools and investigation of the wear of abrasives.
J.D.H.

N82-15782# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

A CRITERION FOR THE DISPOSAL OF M58 SLEEPING BAGS

W. A. Lotens and E. J. M. Smienk 1979 23 p refs In DUTCH; ENGLISH summary
(Contract A77/KL/156)
(IZF-1979-15; TDCK-73398) Avail: NTIS HC A02/MF A01

In order to separate sufficiently insulating from non-sufficiently insulating sleeping bags, a convenient criterion was developed. Physical measurements showed that the thickness of the material under a pressure of 15 N/sq m gives a good correlation with insulating power. By means of a heat conduction model of a man in a bag (based on experiments with subjects) a relation between minimum tolerable outside temperature and thickness of the bag was established. It turns out that with optimal use of all personal equipment a new sleeping bag (26 mm thickness) will fail to keep a man warm in 3% of the man-nights and an old one (12 mm thickness) in 6%. It is recommended to dispose of bags with a thickness less than 20 mm. This result, however, is highly dependent on the insulative suit that is worn. M.G.

N82-15783# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

HEARING PROTECTION

G. F. Smoorenburg, A. M. Mimpen, and H. A. vanLeeuwen 1980 17 p refs In DUTCH; ENGLISH summary
(Contract A76/K/104)
(IZF-1980-2; TDCK-73415) Avail: NTIS HC A02/MF A01

The acoustic attenuation of 20 types of ear plugs and 20 types of ear muffs was surveyed. Important design aspects, the maximum attenuation possible closing the ear canal, the attenuation of plug plus muff, and measuring methods are discussed. To determine the attenuation for practical purposes, differences in hearing protector fitting, temporary removal of protectors, and the noise spectrum must be considered. The effect of wearing hearing protectors on speech intelligibility is discussed. Speech intelligibility does not decrease for people with normal hearing exposed to steady state noise but it may decrease in relatively silent periods of fluctuating or intermittant noise and for all noises if one has a perceptive hearing loss. Author

N82-15784# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

EVALUATION OF CHEMICAL PROTECTIVE FACELETS AND COMPARISON OF FOUR PROTOTPYES

W. A. Lotens 1980 21 p In DUTCH; ENGLISH summary
(Contract A79/KL/111)
(IZF-1980-15; TDCK-75013) Avail: NTIS HC A02/MF A01

In a controlled field experiment four prototypes of chemical protective facelets were tested to determine the effect on physical and mental performance, and the chemical protection and ergonomic properties. Wearing facelets decreases the physical performance on running 400 m resp. 3 km by 3.5 resp. 7.5 percent. When worn during 24 hr. physical performace is variable and mental performance decreases by ca. 10 percent. There is no indication for adaptation within a one-week period. Chemical protection is sufficient for all four types after a while of wearing, however, one of four is highly sensitive for rain. Ergonomic tests show only slight differences between the facelets but there is a marked difference in comfort. Because of this the subjects preferred two types above the other two. Protection during sleep is far from optimal. Author

N82-15785# Institute for Perception RVO-TNO, Soesterberg (Netherlands).

THE LINK-MILES DRIVER TRAINING SIMULATOR FOR TRACKED VEHICLES: INFLUENCE OF CABIN MOTION ON GEAR-CHANGE LEARNING

K. J. Poll 1980 15 p refs In DUTCH; ENGLISH summary
(Contract A76/KL/148)
(IZF-1980-24; TDCK-75017) Avail: NTIS HC A02/MF A01

The influence of the moving base from the Leopard driving simulator on gear-change learning was studied. Twelve trainees were trained with motion and twelve others without motion. All trainees were constantly accompanied by the instructor and after the training on the simulator, all trained on the tank. No differences between both groups were found in learning time on the simulator and in learning time on the tank. This means that the information, given by the motion, can be replaced by good instruction. Author

N82-15786# Sandia Labs., Albuquerque, N. Mex.

SIMULATOR DATA ON HUMAN ERROR PROBABILITIES

E. J. Kozinsky (General Physics Corp.) and H. E. Guttmann 1981 7 p refs Presented at the ANS/ENS Topical Meeting on Probabilistic Risk Assessment, Port Chester, N.Y., 20 Sep. 1981
(Contract DE-AC04-76DP-00789)
(DE81-026094; SAND-81-1707C; CONF-810905-4) Avail: NTIS HC A02/MF A01

Analysis of operator errors on NPP simulators was used to determine human error probabilities (HEP). Simulator data tapes are analyzed for operator error rates. The tapes collected, using performance measurement system software, contain a history of all operator manipulations during simulated casualties. Analysis yields a time history or operational sequence diagram and a manipulation summary, both stored in computer data files. Data searches yield information on operator errors of omission and commission. This work experimentally determined HEP's for probabilistic risk assessment calculations. DOE

N82-15787# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bonn (West Germany). Inst. fuer Flugmedizin.

USE OF A TELEVISION MULTIPOINT x-y TRACKER FOR DETERMINING THE TRANSMISSION OF VIBRATIONS ON HUMAN BEINGS [UEBER DIE ANWENDUNG EINES 'TV-MULTIPOINT x-y TRACKERS' ZUR BESTIMMUNG DER SCHWINGUNGSUEBERTRAGUNG AUF DEN MENSCHEN]

L. Vogt and E. Schwartz 1980 10 p In GERMAN
Avail: NTIS HC A02/MF A01

A television multipoint x-y tracker was used to study the influence of mechanical vibrations on the human body, in a project on human factors in man machine systems. A mechanical model of a human being seated on a shaker was employed on which the mechanical impedance and the vibration transmission (transmissibility) were investigated as a function of vibration frequency. The multipoint x-y tracker provides contactless registration of the motions of the head. The system is based on a television camera, and allows the simultaneous and continuous registration of the x and y coordinates of three points of a moving object. Author (ESA)

N82-15788# Rexnord, Inc., Milwaukee, Wis. Environmental Research Center.

EVALUATION OF AIR CLEANING AND MONITORING EQUIPMENT USED IN RECIRCULATION SYSTEMS

Mark L. Holcomb and Robert C. Scholz Apr. 1981 200 p refs
(Contract PHS-NIOSH-210-78-0011)
(PB81-242695; DHHS/PUB/NIOSH-81-113) Avail: NTIS HC A01; SOD HC CSCL 06J

Several pilot scale air cleaners and monitors were evaluated to determine their performance characteristics, maintenance requirements, and reliability for use in a recirculating exhaust system. A set of evaluation criteria for recirculation system components were developed. Then, selected system components (including an electrostatically augmented fabric filter, electrostatic precipitator, aspirated cartridge filter, four different extractive type particulate air monitors, three different extractive ozone monitors and a safety monitoring filter were installed and tested on a welding process exhaust. The results indicate that many factors must be evaluated before a decision can be reached concerning the use of a particular device. Additionally, components of a complete recirculation monitoring system were identified and the need for the development of commercial devices incorporating all of these components was evidenced by the fact that each of the commercially available devices tested lacked one or more of these components. GRA

N82-15789# National Inst. for Occupational Safety and Health, Cincinnati, Ohio. Div. of Physical Sciences and Engineering.

AN EVALUATION OF ENGINEERING CONTROL TECHNOLOGY FOR SPRAY PAINTING

Dennis M. OBrien and Donald E. Hurley Jun. 1981 185 p refs
(PB81-243123; DHHS/PUB/NIOSH-81-121) Avail: NTIS

MF A01; HC SOD CSCL 06J

Field surveys of 11 finishing operations provided information for an evaluation of control technology for spray painting and coating processes. Studies were conducted in the automobile refinishing, wood and metal furniture, transportation equipment (nonautomotive), heavy machinery, and appliance finishing industries. Processes selected provide representative coverage of spray finishing operations relative to the number of exposed workers, different control techniques, physical size of the workpiece, and the coating systems that are typically used. Control of selected health hazards is discussed; available control options evaluated. Case study summaries include analysis of: hazards, engineering controls and work practices, ventilation measurements, air sampling data and personal protective equipment. Results should be usable as a reference source. GRA

N82-15716*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EMERGENCY MEDICAL SERVICES SYSTEM (EMSS)
Sam E. Pool *In its* STS-1 Med. Rept. Dec. 1981 p 23-27 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06E

N82-15724*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
FOOD AND NUTRITION
Richard L. Sauer and Rita M. Rapp *In its* STS-1 Med. Rept. Dec. 1981 p 59-62 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06H

N82-15725*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
THE POTABLE WATER
Richard L. Sauer *In its* STS-1 Med. Rept. Dec. 1981 p 63-66 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 06K

N82-15738# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
ENVIRONMENTAL CONDITIONS OF AVIATION AND SPACE NAVIGATION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 9-24 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-52)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15741# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INJURY AND PROTECTION OF OVERWEIGHTNESS
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 38-129 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15745# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
FLIGHT ILLUSIONS
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 224-295 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15746# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
MAN'S ADAPTATION TO WEIGHTLESSNESS AND LOW WEIGHT
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ED(RS)T-1802-80) 17 Jul. 1981 p 244-295 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15753# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
COMFORTABLE TEMPERATURE AND TOLERABLE TEMPERATURE
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 477-506 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15760# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
CABIN POLLUTION
In its Fundamentals of Aeron. and Aerospace Med. Sci. (FTD-ID(RS)T-1802-80) 17 Jul. 1981 p 822-873 Transl. into ENGLISH from the book "Fundamentals of Aeronautical and Aerospace Medical Science" Peking, National Defense Industry Publishers, Jun. 1979 (For primary document see N82-15736 06-51)
Avail: NTIS HC A99/MF A01 CSCL 06/5

N82-15765# Joint Publications Research Service, Arlington, Va.
ALL-UNION CONFERENCE ON NEW SOURCES OF FOOD PROTEIN AND THEIR APPLICATION
L. A. Zakordonets *In its* USSR Rept.: Life Sci. Biomed. and Behavioral Sci., No. 13 (JPRS-79639) 10 Dec. 1981 p 10-12 Transl. into ENGLISH from Mikrobiol. Zh. (Kiev), v. 43, no. 2, Mar. - Apr. 1981 p 266-267 Conf. held in Tbilisi, USSR, Nov. 1980 (For primary document see N82-15763 06-51)
Avail: Issuing Activity

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.

For components see *33 Electronics and Electrical Engineering*.

N82-15790# Forschungsinstitut fuer Funk und Mathematik, Werthoven (West Germany).
COMPUTING TIME MEASUREMENTS ON THE FFM MULTICOMPUTER SYSTEM [RECHENZEITMESSUNGEN AM FFM-MULTICOMPERSYSTEM]

G. Neumann, R. Ackermann, and W. Gruenwald Oct. 1980 49 p refs In GERMAN
(FFM-300) Copyright. Avail: Issuing Activity

The computing performance at which the multiminicomputer is capable of delivering was investigated in relation to the operational system price payed for the gain in parallelism. This gain depends on utilization and configuration of the computer network. A software controllable measuring module was developed for measuring computing times. Bus storage behavior of a multiprocessor node of the network and the most important communication tasks of the unloaded system were investigated. A pipeline of tasks, as an example of utilization, was applied. Simultaneously, the influence of high communication rate and high degree of parallel work was studied. These pipeline measurements were compared with the time required for the same task by a single processor. Results show a need for improvement of the system. Author (ESA)

N82-15791# Siemens A.G., Munich (West Germany). Unternehmensbereich Bauelemente.

TECHNOLOGY RELATED INVESTIGATIONS OF HARDWARE VARIATIONS DEPENDING ON SYSTEM PROPOSALS AND NEW APPROACHES TO DECODERS FOR VIDEOTEXT-BILDSCHIRMTEXT Final Report

Peter Preller and Robert Reiner Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 27 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-024; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 5,70

The expenditure for internal components for the integrated circuits of videotext were calculated and compared with the UK-teletext standard (asynchronous transmission associated with the composition method; synchronous transmission with additional data flow; individual improvements). The integration of external components of the data slicer into a MOS-circuit was investigated, especially the function of the adjustable resonance circuit for the data clock. T.M.

N82-15792# Siemens A.G., Munich (West Germany). Werk fuer Integrierte Schaltungen.

MICROCOMPUTER LARGE-SCALE INTEGRATION CHIPS Final Report

Guenter Sandner, Bernd Huber, Irmfried Bromme, Johannes Gruenert, Heinrich Kessler, Hans-Eberhard Longo, Willi Mosch, Adolf Pascher, Gerhard Weil, Klaus Ziebert et al Bonn Bundesministerium fuer Forschung und Technologie Apr. 1981 94 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-068; ISSN-0340-7608) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 19,75

It was the goal of this development project to extend development know how in order to close the gap to the microprocessor market leaders in the USA. In the field of single-chip-microcomputers the development of our nanocomputer was finished successfully. Also the development of two application-oriented single-chip-microcomputers for use in entertainment electronic systems was completed. The CPU 8085, a standard 8 bit microcomputer was developed with license and volume production was started. Beyond that peripheral components, for instance a multifunction asynchronous receiver-transmitter-chip were developed. With respect to the 16 bit microprocessors, the CPU 2016 was developed with success. During the development of the CPU 3016C the original goals with respect to system concept were reached completely and partly with respect to system development. This task will be continued in a following project. Author

N82-15793# Siemens A.G., Munich (West Germany). MOS-Leistungshalbleiter.

MICROCOMPUTER AND LSI COMPATIBLE POWER SWITCH Final Report, Sep. 1980

Jenoe Tihanyi Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 40 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-093; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 8,40

The SIPMOS (Siemens Power MOS) technology was developed for the fabrication of power MOS transistors. SIPMOS transistors with reverse voltages between 50 and 1000 V were assessed and experimentally tested. The feasibility of a MOS driven thyristor and an optically driven triac was demonstrated. Since they are capable of operating on an input voltage as low as 5 V, all the developed SIPMOS devices are directly compatible with microcomputers and LSI circuits. T.M.

N82-15794# Leicher G.m.b.H. und Cie., Unterfoehring (West Germany). Abteilung Elektronik.

DEVELOPMENT ON A NEW KIND OF MICROPROCESSOR-BASED LOCK Final Report, Nov. 1980

Peter Leicher, Christian Kreppel, and Fritz Mueller Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 26 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-128; ISSN-0340-7608) Avail: NTIS HC A03/MF A01

In common unlocking a lock is caused on the knowledge of two coincident informations. Here the lock is built up electronically and the information to be compared is stored in electrically alterable read only memories, of which one is located in the lock and in the key. The information belonging together is altered with every locking cycle. One pair of storage cells is reserved for every lock-key combination. Further, a programming key will be detected, capable of programming and deprogramming the lock function for a key. This aim was reached by building up a single-chip microprocessor based circuit with interface circuits to the electrically alterable read only memories, the random generator and the sequence control units in lock and key. New lines on usage and possibilities on building up and assembling locking systems are given with these kind of locks. So unlocking a car, private building, factory door etc. would be possible without preplanning and replacing locks. Author

N82-15795# Physics Lab. RVO-TNO, The Hague (Netherlands). Research Group 3: Telecommunications.

EDITEX: A TELEX TEXT-EDITOR BASED ON AN 8085 MICROPROCESSOR

N. W. Kaan, P. Feenstra, W. J. M. Geerdink, and N. A. Noz Feb. 1980 29 p refs In DUTCH; ENGLISH summary
(PHL-1980-06; TDCK-73837) Avail: NTIS HC A03/MF A01

A microprocessor-based text editor specially developed to add text editing capabilities to currently used telex machines without any necessary technical changes is described. An overview is given of the hardware and software which were developed to realize the text editor. The User Manual is included. Author

N82-15796# Karlsruhe Univ. (West Germany). Informatik-Rechnerabt.

DEVELOPMENT OF AN X.25 PROTOCOL CONVERTER Final Report

Christopher Chlap and Hans Peter Dittler Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 256 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-DV-81-002; ISSN-0170-1911) Avail: NTIS HC A12/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 42,10

The objective of the project was the development of a cheap X.25-adaption box with universal applicability and good changeability, so that it can easily be adapted to different interface requirements, where especially BASIC MODE protocols were assumed on the primary side. The requirement of low costs was fulfilled by using a common microprocessor type (INTEL 8080). The developed software consists of the modules of the operating system, the X.25 packet level, th X.25 frame level, and of the primary protocol, where the latter can easily be exchanged. The project proved that complex data communication protocols can be implemented on microprocessors, showing a good efficiency. The box supports on the primary side a great variety of single and multidrop lines. T.M.

N82-15797# Battelle Inst., Frankfurt am Main (West Germany).
IMPLEMENTATION AND APPLICATION OF A SET THEORETICAL DATA BASE SYSTEM Final Report
Anton Braig, Siegmar Gweissner, Renate Mandrella, Ursula Matheis, and Juergen Welter Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 194 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-DV-81-004; ISSN-0170-9011) Avail: NTIS HC A09/MF A01

The particular system or model-oriented concepts for data declaration and manipulation restrict the ways in which information can be handled within the currently available conventional and relational-oriented data base systems. A vital extension of a data base systems performance range can be achieved by applying mathematical methods for the implementation of complex logical models for information handling. This was demonstrated by an experimental modular implementation of the essential functions of a data base system applied to a data base problem in the area of document retrieval. An example of automatic handling of descriptor relations of any kind is given by using the hierarchical relations of a technical thesaurus for a suitable variation of the retrieval area. T.M.

N82-15798# Philips Zentrallaboratorium G.m.b.H., Hamburg (West Germany). Forschungsabt. Technische Systeme.
ELECTRONIC PICTURE BASE Final Report
Hans-Dieter Boehring, Hubertus Busch, Jens Christiansen, Jacobus Coumans, Ruediger Grewer, Hans-Dieter Hinz, Herbert Loebl, Dietrich Meyer-Ebrecht, Rainer Pape, Ulf Rothgordt et al Bonn Bundesministerium fuer Forschung und Technologie Sep. 1981 192 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-DV-81-005; ISSN-0170-9011) Avail: NTIS HC A09/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 35,70

The electronic processing and filing of large quantities of pictures was studied. An approach to the architecture of decentralized picture-processing/picture-base systems is described. The signal processing tasks, control tasks, and management task are to be performed in separated system levels. For the signal level a concept was developed for a fast and flexible picture processor, and methods for the implementation of picture operation, in particular picture coding processes, were elaborated. A state-of-technology review of peripheral devices was performed. Extensive investigations were carried out concerning electrostatic grey-tone printing. Promising results were achieved with the electrophoretic process and an experimental system was assembled to study architectural problems as well as to test peripheral devices. T.M.

N82-15799# Sandia Labs., Albuquerque, N. Mex.
DEPTH/BREADTH TRADOFF IN HIERARCHICAL COMPUTER MENUS
Dwight P. Miller 1981 13 p refs Presented at the Human Factors Soc. Meeting, Rochester, N.Y., 12 Oct. 1981
(Contract DE-AC04-76DP-00789)
(DE81-028392; SAND-81-1860C; CONF-81132-1) Avail: NTIS HC A02/MF A01

Goal acquisition speed and accuracy were compared for subjects using four different menu configurations of a semantic hierarchy on an interactive computer terminal. Depth (the number of menu levels) varied from one to six, while breadth (the number of choices per menu) varied from two to 64. Goal acquisition time for the four experimental groups produced a U shaped function with a minimum at the configuration of two levels with eight choices per level. Error data corroborated the acquisition times demonstrating that the fastest conditions also produced the least errors. Optimization of the depth/breadth tradeoff is an important design consideration in goal acquisition tasks requiring speed and accuracy. DOE

N82-15800# Oak Ridge Y-12 Plant, Tenn.
MINICOMPUTER AND COMPUTER NUMERICAL CONTROL MAINTENANCE
G. R. Bright 1981 23 p refs Presented at 1981 Joint Elec. Engr. Seminar Div. of Union Carbide, Nashville, 17-18 Sep. 1981
(Contract W-7405-eng-26)
(DE81-030645; Y/IA-152; CONF-810952-1) Avail: NTIS HC A02/MF A01

Difficult requirements placed upon the electrical and electronics maintenance department by the acquisition of large numbers of computers and precision computer numerical controlled machines, combined with a rapidly changing technology are discussed. The equipment to be maintained, the personnel who perform the maintenance activities, the techniques utilized, the support requirements, and future trends in equipment and maintenance techniques are discussed. Cost reductions and the reduction of downtime are emphasized. DOE

N82-15801# Department of Energy, Washington, D. C. Office of Health and Environmental Research.
DEFINITIONS OF CAMAC TERMS
Jul. 1981 20 p
(DE81-028247; DOE/ER-0104) Avail: NTIS HC A02/MF A01

Definitions and concise explanations of terms used in documents concerning the Computer Automated Measurement and Control (CAMAC) modular instrumentation and digital interface system are presented. DOE

N82-15802# Ecole Nationale Superieure des Telecommunications, Paris (France). Dept. d'Informatique.
THE ARCHITECTURE OF SIRENE: A DISTRIBUTED COMPUTER SYSTEM FOR TEACHING [ARCHITECTURE DE SIRENE: UN SYSTEME D'INFORMATIQUE REPARTIE POUR L'ENSEIGNEMENT]
Jean-Alain Hernandez, Eric Horlait, and Guy Pujolle Jul. 1981 16 p refs In FRENCH Presented at Cong. AFCET-TTI, Nov. 1981
(ENST-C-81004; TTI-6) Avail: NTIS HC A02/MF A01

A system composed of heterogeneous equipment, e.g., graphics consoles and Videotex terminals, linked through a local network is described. Calculation workload is distributed among microcomputers (type Apple 2) and minicomputers. The user can address one (or several) of the communal resources of the system from any terminal. The equipment intercommunication protocols are characterized. The dependence of network efficiency on these protocols is stressed. A layered hierarchy is used and programming language problems are discussed. Author (ESA)

N82-15803# Federal Compiler Testing Center, Washington, D.C.
DECSYSTEM-20, MODEL 2060, COBOL-74, VERSION 12B
29 Jun. 1981 70 p
(PB81-233983; CCVS74-VSR771) Avail: NTIS HC A04/MF A01 CSCL 09B

The validation summary for the Decsystem-20 COBOL-74 compiler version 12B (TOPS-20 verision 4) is presented. An overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974 standards is included. A section relating the categories of discrepancies to each of the Federal levels of the language, and a detailed listing of discrepancies together with the tests which were failed are given. GRA

N82-15804# Federal Compiler Testing Center, Washington, D.C. Automated Data and Telecommunications Service.
DECSYSTEM-10, MODEL 1090-SMP COBOL-74, VERSION 12B
29 Jun. 1981 70 p
(PB81-233975; CCVS74-VSR770) Avail: NTIS HC A04/MF A01 CSCL 09B

The validation summary for the Decsystem-10 COBOL-74 Compiler Version 12B (TOPS-10 Version 7.01) is presented. An overview of the validation which lists all categories of discrepancies by level/module within X3.23-1974 standards is included. A section relating the categories of discrepancies to each of the Federal levels of the language is also provided along with a detailed listing of discrepancies together with the tests which were failed. GRA

N82-15806# Federal Compiler Testing Center, Falls Church, Va. Automated Data and Telecommunications Service.
NORTHERN TELECOM, INC., COBOL/3. INDEXED I-O MODULE
10 Jul. 1981 13 p refs

(PB81-233991; FCTC/TR-81/27) Avail: NTIS HC A02/MF A01 CSCL 09B

The results obtained from the evaluation of the indexed I-O module of the Northern Telecom, Inc. COBOL compiler version COBOL/3 (NTIO OS Version 4.1) against the indexed I-O module of the 1974 COBOL standard are summarized. GRA

N82-15806# National Bureau of Standards, Washington, D.C. Building Equipment Div.

USING MICROCOMPUTERS TO MONITOR THE FIELD PERFORMANCE OF RESIDENTIAL HEAT PUMPS

Charles W. Hurley, George E. Kelly, and Paul A. Kopetka Jun. 1981 119 p refs Sponsored in part by DOE

(PB81-240608; NBSIR-81-2285) Avail: NTIS HC A06/MF A01 CSCL 09B

The procedures, instrumentation, and microprocessor based data acquisition system (DAS) used for evaluating the field performance of three residential heat pumps are described. The instrumentation, signal conditioning unit, and DAS are described in detail. The on-line microcomputer was used to reduce and analyze raw data and record the calculated results. This reduced the amount of data collected and extended the time period between collections. Basic equations and software are described. GRA

N82-15807# Federal Compiler Testing Center, Falls Church, Va.

BASIC FOUR INFORMATION SYSTEMS DIVISION (MAI)/S80 COBOL VERSION 1.00 INDEXED I-O MODULE

24 Aug. 1981 14 p refs

(PB81-248114; FCTC/TR-81/28) Avail: NTIS HC A02/MF A01 CSCL 09B

A consolidated summary of the results obtained from the evaluation of the COBOL compiler version 1.00 against the indexed I-O module of the 1974 COBOL standard is presented. A summary of the I-O language elements together with any errors or discrepancies is given. GRA

N82-15808# Federal Compiler Testing Center, Falls Church, Va.

INTERNATIONAL BUSINESS MACHINES, INC., SYSTEM/34 COBOL, 5726-CB1 RELEASE 7 WITH PTF 07096

18 Aug. 1981 48 p

(PB81-249088; CCVS74-VSR835) Avail: NTIS HC A03/MF A01 CSCL 09B

A consolidated summary of the results obtained from the validation of the COBOL compiler version 2 against the 1974 standard is presented. The compiler was validated at the low-intermediate level of FIBS PUB 21-1. An overview of the validation which lists all categories module within x3.23-1974 is given. A detailed listing is given. A detailed listing of discrepancies that were failed are given. GRA

N82-15809# Federal Compiler Testing Center, Falls Church, Va.

INTERNATIONAL BUSINESS MACHINES, INC., SYSTEM/38 COBOL, 5714-CB1 RELEASE 2

18 Aug. 1981 53 p

(PB81-249104; CCVS74-VSR836) Avail: NTIS HC A04/MF A01 CSCL 09B

A consolidated summary of the results obtained from the validation of the COBOL compiler version 2 against the 1974 COBOL standard is presented. The compiler was validated at the low-intermediate level of FIBS PUB 21-1. An overview of the validation which lists all categories of discrepancies by level or module within x3.23-1974 is given. A detailed listing of discrepancies together with the tests that were failed are given. GRA

N82-15810# Federal Compiler Testing Center, Falls Church, Va.

INTERNATIONAL BUSINESS MACHINES, INC., 5714-CB1 RELEASE 2, INDEXED I-O MODULE

24 Aug. 1981 11 p

(PB81-249112; FCTC/TR-81/26) Avail: NTIS HC A02/MF A01 CSCL 09B

A consolidated summary of the results obtained from the evaluation of the COBOL complier version 2 against the indexed I-O module of the 1974 COBOL standard is presented. A summary of the I-O language elements is given together with any errors or discrepancies. GRA

N82-15811# Federal Compiler Testing Center, Falls Church, Va.

INTERNATIONAL BUSINESS MACHINES, INC., 5726-CB1 RELEASE 7 WITH PTF-07096, INDEXED I-O MODULE

24 Aug. 1981 11 p

(PB81-249120; FCTC/TR-81/25) Avail: NTIS HC A02/MF A01 CSCL 09B

A consolidated summary of the results obtained from the evaluation of the COBOL compiler version 7 against the indexed I-O module of the 1974 COBOL standard is presented. A summary of the I-O language elements is given together with any errors or discrepancies. GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N82-15812 Deutsches Geodaetisches Forschungsinstitut, Munich (West Germany).

DESCRIPTION AND COMPARISON OF ALGORITHMS FOR SOLVING LARGE SETS OF SPARSE MATRIX NORMAL EQUATIONS IN GEODESY AND PHOTOGRAMMETRY Ph.D. Thesis - Technischen Univ., Munich [DARSTELLUNG UND VERGLEICHE VON LOESUNGSSTRATEGIEN FUER GROSSE SCHWACH BESETZTE NORMALGLEICHUNGSSYSTEME IN DER GEODAESIE UND IN DER PHOTOGRAMMETRIE]

Franz Steidler Verlag der Bayerischen Akademie der Wissenschaften 1980 117 p refs In GERMAN

(Ser-C-261; ISSN-0065-5325; ISBN-3-7696-9313-2) Avail: Issuing Activity

Algorithms were investigated in relation to calculation time and data storage capability. For geodetic networks, direct techniques for sparse matrices are very well suited. For photogrammetric bundle-block adjustments with self calibration the conventional use of band algorithms is the best choice. For generating a digital terrain model following the finite element method, the band algorithm solves the normal equations in the fastest way. Author (ESA)

N82-15813*# Boeing Computer Services, Inc., Seattle, Wash. Space and Military Applications Div.

INTEGRATED TESTING AND VERIFICATION SYSTEM FOR RESEARCH FLIGHT SOFTWARE DESIGN DOCUMENT Contractor Report

Richard N. Taylor, Randall L. Merilatt, and Leon J. Osterweil Hampton, Va. NASA 31 Jul. 1979 243 p refs

(Contract NAS1-15253)

(NASA-CR-159095) Avail: NTIS HC A11/MF A01 CSCL 09B

The NASA Langley Research Center is developing the MUST (Multipurpose User-oriented Software Technology) program to cut the cost of producing research flight software through a system of software support tools. The HAL/S language is the primary subject of the design. Boeing Computer Services Company (BCS) has designed an integrated verification and testing capability as part of MUST. Documentation, verification and test options are provided with special attention on real time, multiprocessing issues. The needs of the entire software production cycle have been considered, with effective management and reduced lifecycle costs as foremost goals. Capabilities have been included in the design for static detection of data flow anomalies involving communicating concurrent processes. Some types of ill formed process synchronization and deadlock also are detected statically. M.D.K.

N82-15814*# Virginia Univ., Charlottesville.

FUNCTIONAL DESCRIPTION OF THE ISIS SYSTEM

W. Joseph Berman Oct. 1979 28 p

(Contract NAS1-14862)

(NASA-CR-159152) Avail: NTIS HC A03/MF A01 CSCL 09B

Development of software for avionic and aerospace applications (flight software) is influenced by a unique combination of factors which includes: (1) length of the life cycle of each project; (2) necessity for cooperation between the aerospace industry and NASA; (3) the need for flight software that is highly reliable; (4) the increasing complexity and size of flight software; and (5) the high quality of the programmers and the tightening of project budgets. The interactive software invocation system (ISIS) which is described is designed to overcome the problems created by this combination of factors. M.D.K.

N82-15815# Laboratory for Electronic Development of the Armed Forces, Oegstgeest (Netherlands).

COMPUTER PROGRAM FOR COMPUTING AND PLOTTING BODE, PHASE, AND NYQUIST DIAGRAMS AND TIME RESPONSES OF GIVEN FREQUENCY TRANSFER FUNCTIONS [COMPUTERPRORAMMA VOOR HET BEREKENEN EN PLOTTEN VAN BOE-, FASE EN NYQUIST-DIGRAMMEN VAN TIJDRESPONSIES VAN GEGEVEN FREKWENTIE-OVERDRACHTSFNKTIES]

S. J. Vitterdijk 31 Oct. 1979 76 p In DUTCH; ENGLISH summary
(LEOK-TR-1979-13; TDCK-73396) Avail: NTIS HC A05/MF A01

The background and use of a computer program that calculates and plots the Bode-, phase- and Nyquist-diagram of a given frequency response function of arbitrary order are described. The frequency response function is allowed to be of a direct type function, for example in case of analyzing a filter, or of a feed forward together with a feedback type function, in case of analyzing a control system. The program offers also the possibility of calculating and plotting the time response function, related to a frequency response function, as a result of one of the several possible input signals as function of time. Author

N82-15816# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Operations Research.

ANALYSIS OF HEURISTICS FOR STOCHASTIC PROGRAMMING: RESULTS FOR HIERARCHICAL SCHEDULING PROBLEMS

M. A. H. Dempster (Oxford Univ.), M. L. Fisher (Pennsylvania Univ.), L. Jansen (Algemene Bank Nederland), B. J. Lageweg, J. K. Lenstra, and A. H. G. Rinnooykan (Erasmus Univ.) Jun. 1981 26 p refs Submitted for publication
(Grants NSF ENG-78-26500; NATO-9.2.02(SRG); NATO-1575) (MC-BUT-142/81) Avail: NTIS HC A03/MF A01; Stichting Mathematisch Centrum, Amsterdam FL 3.15

Certain multi-stage decision problems that arise frequently in operations management planning and control allow a natural formulation as multi-stage stochastic programs. In job shop scheduling, for example, the first stage could correspond to the acquisition of resources subject to probabilistic information about the jobs to be processed, and the second stage to the actual allocation of the resources to the jobs given deterministic information about their processing requirements. For two simple versions of this hierarchical scheduling problem, heuristic solution methods are described and their performance is shown asymptotically optimal both in expectation and in probability. T.M.

N82-15817# Battelle Pacific Northwest Labs., Richland, Wash.

COMPARISON OF COMPUTER CODES (CE-THERM, FRAP-T5, GT3-FLECHT, AND TRUMP-FLECHT) WITH DATA FROM THE NRU-LOCA THERMAL HYDRAULIC TESTS

C. L. Mohr, W. N. Rausch, and G. M. Hesson Jul. 1981 8 p refs Presented at the 6th Intern. Conf. on Structural Mech. in Reactor Technol., Paris, 17 Aug. 1981
(Contract DE-AC06-76RL-01830)
(DE81-028136; PNL-SA-9328; CONF-810801-56) Avail: NTIS HC A02/MF A01

The LOCA Simulation Program in the NRU reactor is the first set of experiments to provide data on the behavior of full-length, nuclear-heated PWR fuel bundles during the heatup, reflood, and quench phases of a loss-of-coolant accident (LOCA). This paper compares the temperature time histories of 4 experimental test cases with 4 computer codes: CE-THERM, FRAP-T5, GT3-FLECHT, and TRUMP-FLECHT. The preliminary comparisons between prediction and experiment show that the state-of-the art fuel codes have large uncertainties and are not necessarily conservative in predicting peak temperatures, turn around times, and bundle quench times. DOE

N82-15818# California Univ., Berkeley. Lawrence Berkeley Lab. Energy and Environment Div.

DESCRIPTION OF AN EXACT RECURSIVE METHOD TO SIMPLIFY SHADING CALCULATIONS

A. D. Nawrocki and Ronald Kammerud Apr. 1981 11 p refs Presented at the ASME Solar Energy Div., 3rd Ann. Systems Simulation and Econ. Anal./Heating and Cooling Operational Results Conf., Reno, Nev., 27 Apr. - 1 May 1981
(Contract W-7405-eng-48)
(DE81-027409; LBL-11390; CONF-810405-16) Avail: NTIS HC A02/MF A01

A method called SHADE for simplifying shading calculations as performed by a programmable calculator or microcomputer is described. Preliminary applications of SHADE using a Hewlett Packard HP-41C programmable calculation are outlined. For a given solar hour, SHADE is used to compute the following quantities: the percentage of the total area of the opening which is shaded; the shaded area itself; the cosine of the angle of incidence between Sun and glazing surface; the direct insolation at this surface, with and without shading; and the direct solar power at this surface, with and without shading. In its application, SHADE can be used in preliminary design and comparative analyses of shading devices on an hourly, daily, or seasonal basis, provided that the fins and overhangs are square or rectangular and lie in planes perpendicular to the plane of the opening, and that the opening itself is vertical and rectangular with arbitrary building azimuths. Design candidates include conventional overhangs and side fins, porches, and reveals. In principle, SHADE can be extended to awnings, slatted sun screens, and bevelled recesses and to calculations of direct solar gain through vertical and non-vertical glazings. DOE

N82-15819# Battelle Pacific Northwest Labs., Richland, Wash.

ADVANCED GAMMA SCAN SYSTEM SOFTWARE PACKAGE REFERENCE MANUAL

J. Schroeder Feb. 1981 53 p
(Contract DE-AC06-76RL-01830)
(DE81-028094; PNL-SA-9348) Avail: NTIS HC A04/MF A01

The manual for the Advanced Gamma Scan System (AGSS), used to collect and analyze gamma spectra from reactor fuel pins, is presented. The AGSS software package operates on a minicomputer and controls a precision examination stage, multi-channel analyzer and gamma radiation detector. In addition, the software package provides an operator interface to this system. DOE

N82-15820# Kontron Elektronik G.m.b.H., Eching (West Germany). Image Analysis Div.

DEVELOPMENT OF A COMPUTERIZED MEASURING SYSTEM FOR QUANTITATIVE DIGITAL IMAGE ANALYSIS INTERACTIVE IMAGE ANALYSIS SYSTEM (IBAS) Final Report, Jul. 1980

Gerd Hillje and Rudi Wieczorek Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 43 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-035; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9.10

The system has fast arithmetic routines and either a floppy or hard disk unit. It has a fast analog to digital converter as input unit and a fast digital image-refresh-memory with interactive input possibilities. The system allows direct storage and analysis of the total contents of an image which can be selected automatically or interactively. Processing of any external image input signal can also be done using the parallel mode of operation. The system is programmable in BASIC-FORTRAN. Author (ESA)

N82-15821# Kernforschungszentrum, Karlsruhe (West Germany). Project PDV

SHORT SYSTEM DESCRIPTIONS

B. Karl Aug. 1980 271 p refs In GERMAN; ENGLISH summary

(KfK-PDV-126) Avail: NTIS HC A12/MF A01

Information is given about software/hardware systems including fields of application, user cases, function and performance, data processing field (type of processing, components required, and periphery), publications and documentation as well as commercialization (purchase, renting, training, maintenance, servicing). The short system descriptions relate to tools and techniques of process automation by DP as well as to complete user systems. Author

N82-15822# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.

AUTOMATIC CALCULATION OF SPHEROELLIPTICAL SYSTEMS, ESSENTIAL FACTS, AND ELEMENTARY TRACES (CASSETTE): UTILIZATION [CALCULS AUTOMATIQUES DE SYSTEMES SPHERO-ELLIPTIQUES. TESTS ESSENTIELS ET TRACES ELEMENTAIRES (CASSE-TETE). UTILISATION DU PROGRAMME]

J. Y. LeGall 1981 30 p refs In FRENCH

(LAS-OPT.INST-02-81) Avail: NTIS HC A03/MF A01

A computer program which parametrically characterizes optical systems, having aspherical diopters not of revolution and holographic of classic dispersion, was written. The program makes use of an HP 9825 A desk computer associated with the peripherals HP 2631 A and HP 9872 A. Spot diagrams can be traced, i.e. the section by whatever plane in space of the totality of the rays that issue from a point source and traverse the entire optical system is found. Input and data storage are explained. Operations include: evaluation of the system; calculation of aberrations; find the real ray path; and trace the spot diagram. A wide angle camera is taken as an example. Author (ESA)

N82-15823# Mitre Corp., McLean, Va.

PROCEEDINGS OF SOFTWARE VERIFICATION AND VALIDATION SYMPOSIUM Final Report

Siba N. Mohanty Jun. 1981 497 p refs Symp. held in McLean, Va., 9-10 Jun. 1981

(Contract F19628-81-C-0001)

(PB81-236465; MTR-81W00183) Avail: NTIS HC A21/MF A01 CSCL 09B

A state-of-the-art discussion on software engineering, and the verification and validation (V&V) of software life-cycle activities is presented. The potential application of V&V techniques to software during the system acquisition process is considered. GRA

62 COMPUTER SYSTEMS

Includes computer networks.

N82-15824# Sandia Labs., Albuquerque, N. Mex. Scientific Network Design Div.

SPECIFICATIONS OF SANDIA PROTOTYPE NETWORK COMMUNICATIONS INTERFACE BETWEEN APPLICATIONS SOFTWARE AND NSC A120 ADAPTERS

Rena A. Haynes and Ronald D. Halbgewachs Aug. 1981 30 p refs

(Contract DE-AC04-76DP-00789)

(DE81-028451; SAND-81-0960) Avail: NTIS HC A03/MF A01

A prototype network to provide a software development tool for various network nodes before they are connected to the production network is described. The software and function definitions that will be used in a CDC 7600 level computer for data communications interface between the prototype network input/output mechanism and the physical level of transmission are also described. DOE

N82-15825# Research Inst. of National Defence, Linkoeping (Sweden). Huvudavdelning 3.

ON DATA SECURITY IN A DISTRIBUTED OFFICE COMPUTER SYSTEM

Rolf Blom (Linkoeping Inst. of Technology), Jan-Olof Brueer (Linkoeping Inst. of Technology), Viiveke Faak (Linkoeping Inst. of Technology), and S. Ingvar Aakersten Aug. 1981 48 p refs

(FOA-C-30224-E1; Lith-ISY-I-0460) Avail: NTIS HC A03/MF A01

Trends analysis and a literature review were used to investigate high security data systems. An office with individual work stations having desktop computers is considered. These communicate among themselves and share a host computer of higher capacity including special purpose input/output equipment. Aspects covered include problems related to the protection of data bases; ease of selectively designating addresses and authorization to access data and messages; key distribution and protection; and general requirements for equipment needed in such a local net environment. The main source of overhead is key generation and distribution. Absolute unbreakability is not needed if several security measured are used concurrently.

Author (ESA)

63 CYBERNETICS

Includes feedback and control theory.

For related information see also *54 Man/System Technology and Life Support*.

No abstracts in this category.

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N82-15826# Stichting Mathematisch Centrum, Amsterdam (Netherlands).

NUMERICAL SOLUTION OF A DIFFUSION PROBLEM WITH SEGREGATION AT A MOVING INTERFACE

M. Bakker and D. Hoonhout (FOM-Inst. voor Atoom- en Molecuulfysica) Dec. 1980 21 p refs Submitted for publication

(MC-NW-97/80) Avail: NTIS HC A02/MF A01

The transport of impurities implanted in silicon, which accompanies the annealing of implantation damage by means of pulsed-laser irradiation, is described by a one-dimensional diffusion equation whose solution is discontinuous at a moving interior point. This discontinuity is due to segregation of mass at the liquid/solid interface during (re)solidification. Problems in the numerical solution of the equation are examined. M.G.

N82-15827# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.

THE CONSTRUCTION OF AN ACCURATE LOWER BOUND FOR THE REAL PARTS OF THE EIGEN VALUES OF AN M-MATRIX

Pieter P. N. deGroen (Vrije Univ.) Apr. 1981 8 p refs Submitted for publication

(MC-NW-102/81) Avail: NTIS HC A02/MF A01; Sticthing Mathematisch Centrum, Amsterdam FL 3,15

Let A be an M-matrix, i.e., A is nonsingular, real, irreducible and weakly diagonally dominant and has positive diagonal and nonpositive off diagonal elements. Via the graph of A, a vector W is constructed such that AW is positive. This yields a lower bound of the spectrum, which is optimal in certain problems.

Author

N82-15828# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.

ON THE REGULARITY OF THE PRINCIPLE VALUE OF THE DOUBLE LAYER POTENTIAL

H. Schippers Apr. 1981 26 p refs Submitted for publication

(MC-NW-104/81) Avail: NTIS HC A02/MF A01; Stichting Mathematisch Centrum, Amsterdam FL 3,15

The regularity of the principal value of the potential due to a doublet distribution mu along the boundary S of a two-dimensional (2-D) open connected set is discussed. Assuming S

to be a Lyapunov boundary and mu to be bounded and integrable it is proved that the principal value in 2-D is more regular than the one in 3-D. This result is applied to the aerodynamic problem of calculation of potential flows around 2-D bodies. M.G.

N82-15829# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Numerical Mathematics.
ON THE CHOICE OF SUITABLE OPERATORS AND PARAMETERS IN MULTIGRID METHODS
W. J. A. Mol Jun. 1981 52 p refs
(MC-NW-107/81) Avail: NTIS HC A04/MF A01; Stichting Mathematisch Centrum, Amsterdam FL 6.30

Multigrid methods for the solution of elliptic boundary value problems are discussed. These methods are described by a simple Algol-like program. By special choices of some operators and parameters, almost every multigrid strategy proposed in the literature for linear problems can be recovered. Several possibilities for the restriction, prolongation, coarse grid, and smoothing operators are considered. Furthermore, the number of smoothing steps and the number of coarse grid corrections are discussed. Some comparitive experiments are described with the Poisson, anisotropic diffusion, and the convection-diffusion equations. M.G.

N82-15830# Princeton Univ., N. J. Plasma Physics Lab.
STATISTICAL DESCRIPTION OF AN ATTRACTOR
A. B. Rechester (MIT, Cambridge, Mass.) and R. B. White Jul. 1981 14 p refs
(Contracts DE-AC02-76CH-03073; DE-AS02-78ET-53074)
(DE81-027708; PPPL-1821) Avail: NTIS HC A02/MF A01

Attracting solutions of one dimensional maps are described statistically by an invariant probability distribution. Expressions for the Fourier transform of this function and the Liapunov exponent are derived. Good agreement between the theory and numerical computations is found. DOE

N82-15831# California Univ., Livermore. Lawrence Livermore Lab. Mathematics and Statistics Div.
THEORY AND IMPLEMENTATION OF THE EOS FITTING CODE RATFIT
F. N. Fritsch Apr. 1981 40 p refs
(Contract W-7405-eng-48)
(DE81-029110; UCID-19098) Avail: NTIS HC A03/MF A01

The theory behind the equations of state fitting code RATFIT is detailed and the implementation of the code using existing mathematical software is described. DOE

N82-15832# California Univ., Livermore. Lawrence Livermore Lab.
THERMAL CONVECTION SIMULATION IN THREE DIMENSIONS BY A MODIFIED FINITE ELEMENT METHOD
C. D. Upson, P. M. Gresho, R. L. Sani, S. T. Chan, and R. L. Lee 21 Jul. 1981 24 p refs Presented at the 2nd Intern. Symp. on Numerical Methods and Heat Transfer, College Park, Md., 28-30 Sep. 1981
(DE81-028847; UCRL-85555; CONF-810935-1) Avail: NTIS HC A02/MF A01

In the effort to model the advection and dispersion of pollutants in the planetary boundary layer over complex terrain, a relatively simple computer code was developed for solving the three dimensional Navier-Stokes equations. The computer code was applied to the simulation of a Boussinesq fluid contained in a three dimensional rectangular box which is heated below and cooled above. Temperature difference between these two isothermal surfaces determines the spatial and temporal thermoconvection patterns. Their relevance to natural convection in solar energy collectors, crystal growth in liquids, radioactive waste storage, and more importantly in studying systems of this sort can provide insight into the onset of phase-chaotic induced turbulence. Numerical simulations of the two flow configuration observed experimentally, the three and two-roll cell patterns are presented. These results appear to be the first calculations to truly time-dependent three dimensional confined Benard convection of elevated Rayleigh numbers. DOE

N82-15833# California Univ., Livermore. Lawrence Livermore Lab.
METHODOLOGY AND BASIC ALGORITHMS OF THE LIVERMORE ECONOMIC MODELING SYSTEMS
Robert B. Bell 17 Mar. 1981 43 p refs
(Contract W-7405-eng-48)
(DE81-029430; UCRL-53131) Avail: NTIS HC A03/MF A01

The methodology and the basic pricing algorithms used in the Livermore economic modeling system (EMS) are described. Each algorithm's function is analyzed and a detailed derivation of the actual mathematical expressions used to implement the algorithm is presented. DOE

N82-15834# California Univ., Livermore. Lawrence Livermore Lab.
QUADRANTAL SYMMETRY CALCULATIONS FOR NON-SYMMETRIC HALF-PLANE FILTERS
Dennis M. Goodman 3 Dec. 1980 5 p refs Presented at the 14th Asilomar Conf. on Circuits, Systems and Computers, Pacific Grove, Calif., 17 Nov. 1980
(Contract W-7405-eng-48)
(DE81-030071; UCRL-85156-Rev-1; CONF-801170-2) Avail: NTIS HC A02/MF A01

The conditions under which an all-pole, stable, nonsymmetric half plane filter has a quadrantally symmetric magnitude response are investigated. It is shown that quadrantal symmetry is obtained if and only if the denominator of the transfer function can be written as the product of two functions; the inverse z transforms of these two functions have different regions of support and one of them must obey a symmetry condition. The usefulness of these conditions in filter design algorithms is discussed. DOE

N82-15835# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Operations Research.
SURROGATE DUALITY RELAXATION FOR JOB SHOP SCHEDULING
M. L. Fisher (Pennsylvania Univ.), B. J. Lageweg, J. K. Lenstra, and A. H. G. RinnooyKan (Erasmus Univ.) Aug. 1981 20 p refs Submitted for publication
(Grants NSF ENG-78-26500; NATO-9.2.02(SRG); NATO-1575)
(MC-BW-145/81) Avail: NTIS HC A02/MF A01; Stichting Mathematisch Centrum, Amsterdam FL 3.15

Surrogate duality bounds for the job shop scheduling problem are obtained by replacing the capacity constraints on the machines and the precedence constraints determining the machine order for each job by their weighted sum and strengthening the aggregate constraint by iterating over all possible weights. A theoretical investigation of the resulting relaxations is presented. Results confirm the inherent intractability of the problem, although bounds superior to those obtained by Lagrangean relaxation are produced. Author (ESA)

N82-15836# Research Inst. of National Defence, Linkoeping (Sweden). Huvudavdelning 3.
A SIMPLE INVERSION METHOD FOR DETERMINING AEROSOL SIZE DISTRIBUTIONS
Thomas Kaijser Sep. 1981 32 p refs
(FOA-C-30231-E) Avail: NTIS HC A03/MF A01

The integral equation representing the extinction of light through an aerosol of spherical particles is used to determine aerosol size distributions from light measurements. The method provides a physically realistic solution to the integral equation. It assumes that the solution can be described as a linear combination of log-normal functions. The method is fast and the same parameter set works for all data. Dispersion coefficients > 0.4 are recommended. Author (ESA)

N82-15837# National Aerospace Lab., Amsterdam (Netherlands). Scientific Services Div.
AN ALGORITHM WHICH DETERMINES THE GLOBAL LEAST SQUARES EQUIDISTANT SPLINE FIT
M. R. Best 12 Nov. 1979 27 p refs
(Contract NIVR-1816)
(NLR-TR-80008-U) Avail: NTIS HC A03/MF A01

The algorithm requires linear computation time and constant storage. The method is based on a Cholesky decomposition of the matrix of normal equations belonging to the minimization problem. The special structure of the matrix is heavily exploited. An error analysis is included. T.M.

N82-15838# National Aerospace Lab., Amsterdam (Netherlands). Informatics Div.
ON MARTINGALES AND RECURSIVE OPTIMAL STATE ESTIMATION
G. Moek 26 Jun. 1980 92 p refs
(Contract NIVR-1771)
(NLR-TR-80058-U) Avail: NTIS HC A05/MF A01

A number of theoretical results concerning martingales and linear as well as nonlinear estimation theory are summarized in an innovation and presentation theorem. Based upon this, a simple derivation of the Kalman and Kalman-Buoy filters is sketched. Reference is made to more general estimation problems (counting process observations, martingale noise) which can be solved along the same lines. A wide sense martingale approach to linear estimation is discussed. For a class of signals, comprising those studied in the Kalman and Kalman-Buoy problem, recursive estimation equations for the signal based on observations in either white or colored noise are described. A more general model for colored noise is given. By means of numerical simulation of some model problems the Kalman filter and the wide sense martingale approach are compared. T.M.

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N82-15839# Sheffield Univ. (England). Dept. of Control Engineering.
PROJECTED MARKOV PARAMETERS AND MULTIVARIABLE ROOT-LOCI
D. H. Owens Feb. 1981 14 p refs
(RR-146) Avail: NTIS HC A02/MF A01

An inductive proof of the relationship between the asymptotic behavior of multivariable root-loci and the projected Markov parameters introduced by Kouvaritakis and Edmunds is provided. Author

N82-15840# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
BERRY-ESSEEN THEOREMS FOR SIMPLE LINEAR RANK STATISTICS UNDER THE NULL-HYPOTHESIS
R. J. M. M. Does Apr. 1981 19 p refs Submitted for publication
(MC-SW-71/81) Avail: NTIS HC A02/MF A01; Stichting Mathematisch Centrum, Amsterdam FL 3,15

Berry-Esseen bounds of order O(N(1/2)) are established for simple linear rank statistics under the null-hypothesis. The theorems are proved for a wide class of scores generating functions which includes the normal quantile function. M.G.

N82-15841# Stichting Mathematisch Centrum, Amsterdam (Netherlands). Dept. of Mathematical Statistics.
LINEAR NONPARAMETRIC TESTS FOR COMPARISON OF COUNTING PROCESSES, WITH APPLICATIONS TO CENSORED SURVIVAL DATA
Per Kragh Andersen (Danish Medical and Social Science Research Councils), Oernulf Borgan (Copenhagen Univ.), Richard Gill, and Niels Keiding (Danish Medical and Social Science Research Councils) Jul. 1981 41 p refs Submitted for publication Sponsored in part by Norwegian Research Council for Science and the Humanities and by Association of Norwegian Insurance Companies
(MC-SW-72/81) Avail: NTIS HC A03/MF A01; Stichting Mathematisch Centrum, Amsterdam FL 5,25

Linear nonparametric one- and k-sample tests for counting processes are surveyed. The necessary probabilistic background is outlined and a master theorem proved, which may be specialized to most known asymptotic results for linear rank tests for censored data as well as to asymptotic results for one- and k-sample tests in more general situations, an important feature being that very general censoring patterns are allowed. A survey is given of existing tests and their relation to the general theory, and examples of applications to Markov processes are provided. The relation of the approach to classical nonparametric hypothesis testing theory based on permutation distributions is also discussed. M.G.

N82-15842# University of Southern California, Los Angeles. Dept. of Management.
TABULAR AIDS FOR FITTING WEIBULL MOMENT ESTIMATES
Wallace R. Blischke, L. Guin, and Ernest M. Scheuer (California State Univ., Northridge) Aug. 1981 10 p refs Presented at the Ann. Meeting of the Am. Statist. Assoc.
(Contract N00014-75-C-0733)
(AD-A105965) Avail: NTIS HC A02/MF A01 CSCL 12/1

A table to facilitate fitting moment estimates for a Weibull distribution is given. An estimation procedure is described for use in cases where the sample size is large. M.G.

N82-15843# Research Inst. of National Defence, Linkoeping (Sweden). Huvudavdelning 3.
PROPERTIES OF STOCHASTIC LABELING PROCEDURES
Tommy Elfving and Jan-Olof Eklundh Jun. 1981 31 p refs
(FOA-C-30229-E1) Avail: NTIS HC A03/MF A01

An optimization model for stochastic labeling is formulated and the first order Kuhn-Tucker conditions of the model are derived. The nonzero fixed points of the relaxation scheme by Rosenfeld, Hummel and Zucker are characterized in terms of these conditions. A local convergence result is presented and proved. The use of the relaxation scheme for optimization is illustrated by the problem of classifying a triangle in three dimensional space given two dimensional observations. Results are close to predicted values. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N82-15844# California Univ., Livermore. Lawrence Livermore Lab.
IDENTIFIER PROTECTION IN A DISTRIBUTED OPERATING SYSTEM
D. M. Nessett 6 Jun. 1981 6 p refs Presented at the Natl. Electron. Conf., Chicago, 26-28 Oct. 1981
(Contract W-7405-eng-48)
(DE81-025978; UCRL-86143; CONF-811020-1) Avail: NTIS HC A02/MF A01

A scheme was recently presented to protect capabilities in a distributed operating system. This scheme uses public-key encryption to ensure that capabilities cannot be stolen in a form useful to the thief nor forged by an unauthorized process or user. Unfortunately, security and efficiency considerations make currently available public-key encryption techniques unattractive. This report focuses on the characteristics an identifier protection scheme must possess and on the use of secret-key encryption to provide identifier protection. DOE

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

No abstracts in this category.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N82-15845# California Univ., Livermore. Lawrence Livermore Lab.
TEMPERATURE MEASUREMENTS OF SHOCKED TRANS-

LUCENT MATERIALS BY TIME-RESOLVED INFRARED RADIOMETRY
William G. VonHolle 4 Jun. 1981 6 p refs Presented at the APS Conf. on Shock Waves in Condensed Matter, Menlo Park, Calif., 23-25 Jun. 1981 Submitted for publication
(Contract W-7405-eng-48)
(DE81-028426; UCRL-85381; CONF-810684-47) Avail: NTIS HC A02/MF A01

Infrared emission in the range 2 to 5.5 micrometers has been used to measure temperatures in shock-compressed states of nitromethane, cyclohexane and benzene and in polycrystalline KBr. Polymethylmethacrylate shows anomolous emission probably associated with some heterogeneity. DOE

N82-15846# Brookhaven National Lab., Upton, N. Y. Dept. of Physics.
NUMERICAL STUDIES OF GAUGE FIELD THEORIES
Michael Creutz Jun. 1981 28 p refs Presented at the 19th Intern. School of Subnucl. Phys., Erice, Italy, 31 Jul. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030526; BNL-29840; CONF-810762-1) Avail: NTIS HC A03/MF A01

The application of Monte Carlo simulation to quantized gauge field theories is described. Strong numerical evidence that the standard SU(3) non-Abelian gauge theory of the strong interaction is capable of simultaneously confining quarks into the physical hadrons and exhibiting asymptotic freedom is presented. In four dimensions, confinement is a nonperturbative phenomenon. Essentially all models of confinement the widely separated quarks together with strings of gauge field flux. This gives rise to a linear potential at long distances. A Monte Carlo program generates a sequence of field configuration by a series of random changes of the fields. The algorithm is so constructed that ultimately the probability density for finding any given configuration is proportional to the Boltzmann weighting. The lattices are brought into thermal equilibrium with a heat bath at a temperature specified by the coupling constant, performing computer experiments with four dimensional crystals stored in a computer memory. As the entire field configuration is stored, any correlation function desired is accessible. The kinds of experiments being done and the implications of these results for strong interaction physics are described. DOE

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N82-15847*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
APPLICATION OF STEADY STATE FINITE ELEMENT AND TRANSIENT FINITE DIFFERENCE THEORY TO SOUND PROPAGATION IN A VARIABLE AREA DUCT: A COMPARISON WITH EXPERIMENT
Kenneth J. Baumeister, W. Eversman (Missouri Univ., Rolla), R. J. Astley (Missouri, Univ., Rolla), and J. W. White (Tennessee Univ., Knoxville) 1981 14 p refs Presented at the 7th Aeroacoustics Conf., Palo Alto, Calif., 5-7 Oct. 1981; sponsored by AIAA
(NASA-TM-82678; E-960) Avail: NTIS HC A02/MF A01 CSCL 20A

Sound propagation without flow in a rectangular duct with a converging-diverging area variation was studied experimentally and theoretically. The area variation was of sufficient magnitude to produce large reflections and induce modal scattering. The rms (root-mean-squared) pressure and phase angle on both the flat and curved surface were measured and tabulated. The steady state finite element theory and the transient finite difference theory are in good agreement with the data. It is concluded that numerical finite difference and finite element theories appear ideally suited for handling duct propagation problems which encounter large area variations. M.G.

N82-15848*# Purdue Univ., Lafayette, Ind. School of Mechanical Engineering.
A STUDY OF METHODS OF PREDICTION AND MEASUREMENT OF THE TRANSMISSION SOUND THROUGH THE WALLS OF LIGHT AIRCRAFT Semiannual Report
B. Forssen, Y. S. Wang, and Malcolm J. Crocker Dec. 1981 24 p refs
(Grant NAG1-58)
(NASA-CR-165040; Rept-2; HL-81-34) Avail: NTIS HC A02/MF A01 CSCL 20A

Several aspects were studied. The SEA theory was used to develop a theoretical model to predict the transmission loss through an aircraft window. This work mainly consisted of the writing of two computer programs. One program predicts the sound transmission through a plexiglass window (the case of a single partition). The other program applies to the case of a plexiglass window window with a window shade added (the case of a double partition with an air gap). The sound transmission through a structure was measured in experimental studies using several different methods in order that the accuracy and complexity of all the methods could be compared. Also, the measurements were conducted on the simple model of a fuselage (a cylindrical shell), on a real aircraft fuselage, and on stiffened panels. B.W.

N82-15849# Institute for Perception RVO-TNO, Soesterberg (Netherlands).
THE SOUND ATTENUATION OF THE WILLSON EARMUFF NUMBER 250 AND THE AMPLIVOX, TYPE H4016
A. M. Mimpen Apr. 1979 7 p In DUTCH; ENGLISH summary
(Contract A76/K/104)
(IZF-1979-9; TDCK-72155) Avail: NTIS HC A02/MF A01

By measuring the binaural threshold for pure tones with and without wearing an earmuff the sound attenuation as a function of frequency was determined with ten subjects for the Willson-earmuff, no. 250. In the same way the sound attenuation was determined for the Amplivox, type H4016 with built-in telephones. Both the Willson earmuff, no. 250 and the Amplivox, type H4016 have a good sound attenuation, also at low frequencies. Author

N82-15850# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Berlin (West Germany). Abteilung Turbulenzforschung.
SOUND MEASUREMENT IN FLOWS: DETERMINATION OF THE NOISE LEVEL DUE TO TURBULENT PRESSURE VARIATIONS BY COMPARING THE MEASUREMENTS WITH A NOSE CONE AND WITH A SLOTTED TUBE [SCHALLMESSUNGEN IN STROEMUNGEN - BESTIMMUNG DES STOERPEGELS INFOLGE TURBULENTER DRUCKSCHWANKUNGEN DURCH VERGLEICHSMESSUNG MIT NASENKONUS UND SCHLITZROHR]
W. Neise 1981 4 p refs In GERMAN
Avail: NTIS HC A02/MF A01

A method for the separation of sound and noise signals in flow channels is described. The two signals as a function of frequency are compared. It is assumed that sound and turbulent noise signals are statistically independent, and that the microphone noise levels are different when using a nose cone or a slotted tube. The use of comparative measurement is simple in the frequency domain of plane waves, the wave propagation being parallel to the channel axis and the sound pressure being constant in a cross section. The case of higher modes in the channel is considerably more problematic and requires laborious measurements and treatments. Author (ESA)

N82-15851# Technische Universitaet, Hanover (West Germany). Inst. fuer Messtechnik im Maschinenbau.
NOISE REDUCTION DURING THE PRODUCTION OF THICK WALLED STEEL CONSTRUCTIONS BY MEANS OF IMPACT PROCESSING TECHNIQUES Final Report, Jul. 1980
Bernard Dupuis Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 84 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-HA-81-008) Avail: NTIS HC A05/MF A01; fachinformationszentrum, Karlsruhe, West Germany DM 17,60

A number of measures are described that can be taken to reduce the noise generated by techniques using impactors in the production of thick walled steel constructions. In most

workshops, the noise usually exceeds by far the legal noise limit. Suggestions, based on laboratory tests, are made for noise reduction by modification of the manufacturing procedure, by adaptation of the tools, and by diminishing the excitation and emission characteristics of the body under construction. By means of specific examples of container and steelframe construction, it is demonstrated that noise generated by impact processes can indeed be reduced to a large extent. Author (ESA)

N82-15852# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).
SOUND DAMPING IN A CONDENSATION LOADED GAS FLOW [SCHALLDAEMPFUNG IN EINER KONDENSATBELADENEN GASSTROEMUNG]
Martin Huettig Dec. 1980 98 p refs In GERMAN; ENGLISH sumary
(MPIS-24/1980; ISSN-0436-1199) Avail: NTIS HC A05/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 17.45

The sound absorption by suspended water droplets in an air flow with Mach-number 0.72 was investigated in a tube cm in length and 5 cm in diameter. The portion of the condensate is less than 10 g per kg air, the radius of the droplets is probably 2.5 x 10 to the -8 power < r sub tm < 10 to the -7 power m. At frequencies in the range from 2 kHz to 50 kHz, sound absorption from 5 dB/m to 140 dB/m is obtained. Author

N82-15728*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CABIN ACOUSTICAL NOISE
Jerry L. Homick *In its* STS-1 Med. Rept. Dec. 1981 p 79-80
(For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 20A

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N82-15853*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ATLAS OF ABSORPTION LINES FROM 0 TO 17 900 cm(-1)
Jae H. Park, L. S. Rothman (AFGL), C. P. Rinsland (Coll. of William and Mary, Williamsburg, Va.), M. A. H. Smith, D. J. Richardson (Systems and Applied Sciences Corp., Hampton, Va.), and J. C. Larsen (Systems and Applied Sciences Corp., Hampton, Va.) Washington Dec. 1981 209 p refs
(NASA-RP-1084; L-14720) Avail: NTIS HC A10/MF A01 CSCL 07D

Plots of absorption line strength versus line position for wavenumbers from 0 to 17,900 cm(-1) are shown for 20 atmospheric gases (H2O, CO2, O3, N2O, CO, CH4, O2, NO, SO2, NO2, NH3, HNO3, OH, HF, HCl, HBr, HI, ClO, OCS, H2CO). Also shown are similar plots of lower-state energy values for adsorption lines for the strongly adsorbing atmospheric gases (H2O, CO2, O3, and CH4) for wavenumbers from 0 to 5000 cm(-1). M.G.

N82-15854# Ohio Univ., Athens.
STUDY OF STRUCTURE OF NUCLEI WITH NEUTRONS AND NUCLEAR DATA MEASUREMENTS FOR MFE Progress Report, 1 Sep. 1980 - 1 Jul. 1981
Raymond O. Lane 1981 73 p refs
(Contract DE-AS02-76ER-02490)
(DE81-028388; DOE/ER-02490/2) Avail: NTIS HC A04/MF A01

Measurements of neutron differential elastic and inelastic scattering cross sections were made for C-13 and O-18. For Li-7 + n, a multichannel R-matrix analysis was completed, providing much new structure information for the compound Li-8 system. These results are in very good agreement with recent theoretical model calculations, so that together the two provide considerable advancement in the state of our knowledge of Li-8. R-matrix analyses of B-11 + n, C-12 + n, C-13 + n and inelastic scattering data have also been completed. For all three nuclei, comparisons of theoretical results with the R-matrix analysis are made. The triplet quadrupole spectrometer (TQS) is now fully operational. Development of new detectors, techniques, data analysis codes and theoretical model codes for use with the TQS system is complete. Construction of the long-flight-path tunnel for the swinger magnet facility is complete. DOE

N82-15855# Sandia Labs., Albuquerque, N. Mex.
LOW-ENERGY X-RAY EMISSION FROM LIGHT ION TARGETS
L. P. Mix, E. J. T. Burns, D. L. Fehl, D. L. Hanson, and D. J. Johnson 1981 15 p refs Presented at the Topical Conf. on Low-Energy X-ray Diagnostics, Livermore, Calif., 8 Jun. 1981
(Contract DE-AC04-77DP-00789)
(DE81-028249; SAND-81-0842C; CONF-810651-5) Avail: NTIS HC A02/MF A01

Dagnostics are described. Soft X-ray plasma measurements made on targets on the 200 times smaller Proto I accelerator are presented. Plasma brightness temperatures of 20 eV have been observed in the deposition region and 35 eV (100 eV electron temperature) in the stagnation region of imploding conical Al targets on Proto I. DOE

N82-15856# Maryland Univ., College Park. Dept. of Physics and Astronomy.
DYNAMICS OF HADRON-NUCLEUS INTERACTIONS
Steven J. Wallace Jul. 1981 25 p refs Presented at the 9th Intern. Conf. on High Energy Phys. and Nucl. Structure (9-ICOHEPANS), Versailles, France, 6-10 Jul. 1981
(Contract DE-AS05-76ER-05126)
(DE81-026272; CONF-810747-3; ORO-5126-145) Avail: NTIS HC A02/MF A01

Recent progress in diffraction theory shows that proton-nucleus scattering at nonforward angles is dominated by the interference of waves from two or more bright spots. Analytic formulas based on asymptotic theories of diffraction have yielded valuable new insights into the scattering and these formulas can be readily extended to illuminate the role of dynamical ingredients, i.e., the nucleon-nucleon amplitudes. The governing parameters of the diffraction and some direct connections between the observed cross sections and the input dynamics are reviewed. New information regarding the nucleon-nucleon parameters based on recent phase shift analyses show some systematic differences from the effective NN amplitudes which produce fits to proton-nucleus diffraction data. Recent progress in understanding the role of delta isobars in proton-nucleus dynamics is reviewed. DOE

N82-15857# Temple Univ., Philadelphia, Pa. Dept. of Physics.
EXPERIMENTAL INVESTIGATIONS IN PARTICLE PHYSICS AT INTERMEDIATE ENERGIES Progress Report, 1 Dec. 1980 - 30 Nov. 1981
L. B. Auerbach, V. L. Highland, and W. K. McFarlane Jul. 1981 12 p refs
(Contract DE-AC02-76ER-03539)
(DE81-027954; DOE/ER-03539/T1; COO-3539-16) Avail: NTIS HC A02/MF A01

Data-taking on the pion-beta-decay measurement and substantial progress in its analysis are reported. The low-energy anti pp annihilation cross section experiment is near completion. Planning for a new pi-zero-to-three-gamma experiment at LAMPF is complete. The proposal to use the LEAR facility at CERN for further anti pp work has been approved, and some contributions to the preparation of a neutrino experiment proposal at LAMPF. DOE

N82-15858# Brookhaven National Lab., Upton, N. Y.
HYPERNUCLEI AND INTERACTIONS OF KAONS WITH NUCLEI
Carl B. Dover 1981 18 p refs Presented at the 9th Intern. Conf. on High Energy Phys. and Nucl. Structure, Versailles, France, 6-10 Jul. 1981
(Contract DE-AC02-76CH-00015)
(DE81-028467; BNL-29774; CONF-810747-1) Avail: NTIS HC A02/MF A01

Different models for hyperon-nucleus central and spin-orbit

potentials are compared: several models yield a very small spin-orbit strength for the lambda, as experimentally observed, but differ considerably in their predictions for the sigma. The new data on the C-13 hypernuclear spectrum, as obtained in the strangeness exchange reaction at 800 MeV/c, are discussed. It is shown how one extracts constraints on the lambda nucleus and effective lambda nucleon interactions from the data. The new BNL data on the (anti kaon, pion) reaction at 720 MeV/c, leading to sigma hypernuclear states, are examined. The case of Li-6(anti kaon, pion)H-6 reaction is discussed, and some speculations concerning the (anti kaon, pion) reaction on other targets are presented. The physical mechanisms which may lead to unusually narrow sigma excitations in some systems are examined. The physics motivations for several future hypernuclear experiments which are already under development, or under preliminary consideration are reviewed. DOE

N82-15859# California Univ., Livermore. Lawrence Livermore Lab. Dept. of Physics and Astronomy.
PARAMETERIZATION OF THE BREMSSTRAHLUNG SPECTRUM
I. J. Feng and R. H. Pratt 31 Aug. 1981 52 p
(Contract W-7405-eng-48)
(DE81-029739; UCRL-15384; PITT-266) Avail: NTIS HC A04/MF A01

A parameterization is provided for the bremsstrahlung spectrum in the incident electron energy range 10 to 500 keV for all elements, with particular emphasis on the range 20 to 100 keV for Z = 41 to 92. A general accuracy of 20% is achieved, with 50% in the worst cases, in most ranges utilizing simple one variable functions. DOE

N82-15860# Battelle Pacific Northwest Labs., Richland, Wash.
CONTINUUM ELECTRON EMISSION IN HEAVY ION: ATOM COLLISONS
L. H. Toburen Feb. 1981 57 p refs Presented at the Seminar on High Energy Ion-Atom Collision Processes, Debrecen, Hungary, 17 Mar. 1981
(Contract DE-AC06-76RL-01830)
(DE81-028234; PNL-SA-9306; CONF-810392-1) Avail: NTIS HC A04/MF A01

The measurement of energy losses of heavy ions in molecular targets is reviewed. Topics covered include ionization by protons, ionization by helium ions, and ionization by carbon impact. An appendix gives a data compilation of ejected energies and ejected electron energies and ejection angles for proton collision with H2, He, Ne, Ar, Kr, Xe, N2, O2, H2O, CH4, C2H2, C2H4, C2H6, C6H6, NH3, CH3NH2, C2H5NH2, SF6, and TeF6. Double differential cross sections are included for several ion molecular collisions. DOE

N82-15861# Brookhaven National Lab., Upton, N. Y.
COULOMB EXPLOSION OF LARGE PENETRATING MOLECULAR CLUSTERS
H. E. Wegner and P. Thieberger 1981 40 p refs Presented at the 5th NYU Workshop on Penetration Phenomena: Exotic Projectiles in Matter, New York, 8-10 Jan. 1981
(Contract DE-AC02-76CH-00016)
(DE81-025866; BNL-29448; CONF-810152-1) Avail: NTIS HC A03/MF A01

Coulomb explosion measurements are made to determine the structure of large penetrating molecular clusters and other complex molecules, and also to determine what other special phenomena comes into play as these complex molecules pass through matter. An image intensifier detector system, coupled with a microcomputer, is used. DOE

N82-15862# Oak Ridge National Lab., Tenn. Fusion Energy Div.
IMPROVEMENT OF GAS EFFICIENCY OF NEGATIVE ION SOURCES
J. H. Whealton Aug. 1981 15 p refs
(Contract W-7405-eng-26)
(DE81-028031; ORNL/TM-7885) Avail: NTIS HC A02/MF A01

A modification of the currently operating Calutron, magnetron, and modified duoPIGatron negative ion source is proposed. The modification should improve gas efficiency by more than an order of magnitude in the Calutron, by a factor of five in the magnetron, and by a factor of two in the duoPIGatron. DOE

N82-15863# Illinois Univ., Urbana. Materials Research Lab.
ILLUSTRATIVE NUMERICAL COMPARISONS BETWEEN PHONON MEAN FREE PATHS AND PHONON THERMAL CONDUCTIVITY
W. M. MacDonald and A. C. Anderson 1981 9 p refs Presented at the Intern. Joint Conf. on Thermophys. Properties, Gaithersburg, Md., 15 Jun. 1981
(Contract DE-AC02-76ER-01198)
(DE81-028180; DOE/ER-01198/1361; CONF-810683-5) Avail. NTIS HC A02/MF A01

Measurements of thermal conductivity are often used as an interrogative technique to learn about phonon scattering processes in solids. In general the relationship between thermal conductivity lambda and a phonon mean free path 1 is complex and it is therefore necessary to make some simplifying assumptions in order to make this relationship tractable. These assumptions may lead to erroneous conclusions, many of which have appeared in the published literature. An intuitive insight is provided to the relationship between lambda and 1. DOE

N82-15864# Oak Ridge National Lab., Tenn.
SELECTED TOPICS IN THERMAL AND RESONANCE NEUTRON CAPTURE
S. Raman 1981 19 p refs Presented at the 4th Intern. Symp. on Neutron Capture Gamma-Ray Spectry. and Related Subjects, Grenoble, France, 7-11 Sep. 1981
(Contract W-7405-eng-26)
(DE81-029676; CONF-810920-13) Avail: NTIS HC A02/MF A01

Energy and intensity standards direct thermal neutron capture and primary E2 transitions in (n, gamma) reactions are discussed. Nonstatistical effects in resonance neutron capture, transmission measurements of Sc employed in 2 keV facilities, and tests of Axe-Brink predictions of gamma ray strength functions via average resonance capture are also presented. DOE

N82-15865# Argonne National Lab., Ill.
DETERMINATION OF NUCLEAR-MATTER TEMPERATURE AND DENSITY
Kevin L. Wolf 1980 58 p refs Presented at the Workshop on Future Relativistic Heavy Ion Expt., Darmstadt, West Germany, 7-10 Oct. 1980
(Contract W-31-109-eng-38)
(DE81-023847; CONF-8010154-4) Avail: NTIS HC A04/MF A01

Information learned about nuclear matter under extreme conditions during the past few years in relativistic heavy ion studies are reviewed. The completion of analyses and publication of results from the impact parameter-selected, single-particle inclusive experiments is discussed. Preliminary results from the new generation of two-particle correlation and particle-exclusive measurements, especially those using streamer chambers are considered. The measurement of more exotic ejectiles with long mean free paths in nuclear matter is discussed. Calculations offering guidance and providing explanations of high energy collisions, particularly the Monte Carlo and intranuclear cascade calculations, are evaluated. DOE

N82-15866# California Univ., Berkeley. Lawrence Berkeley Lab.
MID-RAPIDITY PION CROSS SECTIONS: NEW DATA CONFRONT THEORIES
K. A. Frankel, J. A. Bistirlich, R. Bossingham, H. R. Bowman, K. M. Crowe, C. J. Martoff, J. Miller, D. L. Murphy, J. O. Rasmussen, J. P. Sullivan et al Jul. 1981 6 p refs Presented at the 5th High Energy Heavy Ion Study, Berkeley, Calif. 18-22 May 1981
(Contract W-7405-eng-48)
(DE81-028014; LBL-12641; CONF-8105104-5) Avail: NTIS HC A02/MF A01

Pion production by collisions of relativistic heavy ions has been studied recently. For the reaction 1.05 GeV/A Ar + Ca pion (+), they discovered a peak in the invariant cross section at mid-rapidity at P/sub perpendicular/approximately 0.5 m/sub pion/c. This peak is not apparent in the 730 MeV p(+)p and was attributed to possible hydrodynamic flow effects. Several

authors have suggested that the pion(+) peak is a Coulomb effect. These models predict the pion(-) would be drawn in towards the fireball, leaving an essentially flat distribution in the mid-rapidity region. Mid-rapidity pion(+) and pion(-) cross sections were measured using at 1.05 GeV/A argon beam with a calcium target. The pions were measured with a magnetic spectrometer set at 15 degrees to the beam and were stopped in a scintillator range telescope. Results are presented and discussed. DOE

N82-15867# California Univ., Berkeley. Lawrence Berkeley Lab. Nuclear Science Div.

THEORY OF COULOMB DISTORTION OF PION SPECTRA BY HEAVY-ION SPECTATOR FRAGMENTS

J. O. Rasmussen, H. M. A. Radi (Kuwait Univ.), J. P. Sullivan, K. A. Frankel, , and O. Hashimoto (Tokyo Univ., Japan) Jul. 1981 7 p refs Presented at the 5th High Energy Heavy Ion Study, Berkeley, Calif., 18-22 May 1981

(Contract W-7405-eng-48)

(DE81-028013; LBL-12623; CONF-8105104-7) Avail: NTIS HC A02/MF A01

It has been known for over two years now that the pion(-) spectrum from heavy ion collisions peaks near beam velocity and that the pion (+) spectrum has a corresponding depression. It has been guessed that these features are Coulomb effects of projectile fragments. A theoretical treatment of this phenomena is given, and results are compared with experimental data. DOE

N82-15868# Institut Max von Laue/Paul Langevin, Grenoble (France).

PHONONS IN GRAPHITE INTERCALATION COMPOUNDS MEASURED BY NEUTRON SCATTERING

A. Magerl and H. Zabel (Illinois Univ. at Urbana-Champaign) 1981 8 p refs Presented at the Conf. on Phys. of Intercalation Compounds, Trieste, Italy, 6 Jul. 1981

(Contract DE-AC02-76ER-01198)

(DE81-029681; DOE/ER-01198/1354; CONF-810758-1) Avail: NTIS HC A02/MF A01

The entire phonon dispersion of a solid can be measured by neutron scattering under favorable conditions. Triple axis spectroscopy allows the phonon energies to be determined for a chosen polarization at well defined wave vectors q throughout the Brillouin zone (BZ). In the case of graphite a complete measurement of the phonon dispersion is not possible because of the limited size of (natural) single crystals, and because of the high energy approximately 200 meV of some branches. Only a limited amount of neutron data have been collected with pyrolytic graphite (PG). The high energy branch of stage 3 K together with complete (001) L dispersions for stage 2 K, Rb and Cs and stage I K and Cs are presented for the first time. It is shown that a Born-vanKarman formalism is inappropriate, however, including an interaction with an electronic layer between alkali and bonding graphite planes results in a shell model, which can consistently describe the measurement for all compounds. M.D.K.

N82-15869# Pacific Northwest Lab., Richland, Wash.

STRESS DEPENDENCE OF CREEP IN Ni BOMBARDED WITH 17-MeV DEUTERONS

C. H. Henager, Jr., E. P. Simonen (Washington Univ., Seattle), E. R. Bradley, and R. G. Stang Jul. 1981 6 p refs Presented at the 2nd Fusion Reactor Mater. Meeting, Seattle, 9-12 Aug. 1981

(Contract DE-AC06-76RL-01830)

(DE81-030080; PNL-SA-9728; CONF-810831-54) Avail: NTIS HC A02/MF A01

A linear stress dependence of irradiation creep was observed in pure, heavily cold-worked Ni and the creep behavior was modeled using a climb-glide creep mechanism. The Ni foils were bombarded with 17 MeV deuterons at 473 K with a damage rate of 0.0000006 dpa/s. The applied tensile stress ranged from 135 MPa to 250 MPa. Transmission electron microscopy revealed that up to 50% of the material had recrystallized during the pre-irradiation thermal creep test. A high number density of interstitial loops were observed throughout the material. Small voids were observed primarily in the recrystallized regions. The creep rate magnitude and stress dependence was rationalized using models of loop hardening of rate theory predictions of point defect annihilation at sinks. DOE

N82-15870# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.

TRITIUM AUTORADIOGRAPHY

George R. Caskey, Jr. 1981 28 p refs Presented at the TMS/AIME Fall Meeting on Advanced Tech. for the Characterization of Hydrogen in Metals, Louisville, Ky., 11-15 Oct. 1981

(Contract DE-AC09-76SR-00001)

(DE81-030521; DP-MS-81-12; CONF-811037-1) Avail: NTIS HC A03/MF A01

Hydrogen distribution and diffusion within many materials may be investigated by autoradiography if the radioactive isotope tritium is used in the study. Tritium is unstable and decays to helium-3 by emission of a low energy (18 keV) beta particle which may be detected photographically. The basic principles of tritium autoradiography were discussed. Limitations are imposed on the technique by: (1) the low energy of the beta particles; (2) the solubility and diffusivity of hydrogen in materials; and (3) the response of the photographic emulsion to beta particles. These factors control the possible range of application of tritium autoradiography. The technique was applied successfully to studies of hydrogen solubility and distribution in materials and to studies of hydrogen damage. DOE

N82-15871# California Univ., Berkeley. Lawrence Berkeley Lab.

COMPUTER SIMULATION OF ORGANIC AND BIOLOGICAL MOLECULES

Arthur J. Olson, ed. 1981 80 p refs Presented at the Workshop on Computer Simulation of Org. and Biol. Molecules, Pacific Grove, Calif., 5-8 Jan. 1981

(Contract W-7405-eng-48; Grant NSF CHE-7721305)

(DE81-029948; LBL-12979; CONF-810149; NRCC-PROC-11) Avail: NTIS HC A05/MF A01

Molecular mechanics applied to smaller molecules, conformational studies of nucleotides, and dynamics and energetics of small peptides were discussed. Larger systems including proteins and protein hydration also were discussed. Monte Carlo simulations of hydration were addressed. Two talks on drug design represented a new community exhibiting great interest in the field. The desirability of writing a general software package for calculating the properties of molecular systems from classical mechanics using an analytical representation of the energy was considered. DOE

N82-15872# California Univ., Livermore. Lawrence Livermore Lab.

RESULTS OF CALCULATIONS OF EXTERNAL GAMMA-RADIATION EXPOSURE RATES FROM FALLOUT AND THE RELATED RADIONUCLIDE COMPOSITIONS. OPERATION RANGER, 1951

Harry G. Hicks Jul. 1981 63 p refs

(Contract W-7405-eng-48)

(DE81-030467; UCRL-53152-Pt-1) Avail: NTIS HC A04/MF A01

Radioactivity outside the Nevada Test Site complex is examined. Data on calculated gamma radiation exposure rates and ground deposition of related radionuclides are presented. DOE

N82-15873# Oak Ridge National Lab., Tenn.

ONE AND A HALF CENTERED EXPANSION FOR ION-ATOM COLLISIONS

J. F. Reading, A. L. Ford, and R. L. Becker 1980 21 p refs Presented at the Intern. Conf. on X-ray Processes and Inner-shell Ionization, Stirling, UK, 25 Aug. 1980 Prepared in cooperation with Texas A and M Univ.

(Contract W-7405-eng-26)

(DE81-028142; CONF-800859-8) Avail: NTIS HC A02/MF A01

Fast ion-atom collisions in which charge transfer plays a dominant role have been traditionally treated by a two center expansion (TCE); the state wavefunction is approximated by a truncated set of Hilbert states centered on the target and projectile. This method is accurate but expensive in the use of computer time. A new method which allows charge transfer through variational time independent amplitudes, and target excitation and ionization through variation time dependent amplitudes is presented. The method retains the efficiency of a single centered expansion and yet reproduces the conventional TCE results in

situations where charge transfer is dominant. Comparison to experiment is made. DOE

N82-15874# Sandia Labs., Albuquerque, N. Mex.
SURVEY OF ATOMIC PHYSICS ISSUES IN EXPERIMENTAL INERTIAL CONFINEMENT RESEARCH
Allan Hauer (Los Alamos National Lab.) and E. J. T. Burns 1981 14 p refs Presented at the 12th IPEAC Intern. Conf. on the Phys. of Electron. and Atomic Collisions, Gatlinburg, Tenn., 15 Jul. 1981
(Contract DE-AC04-76DP-00789)
(DE81-028389; SAND-81-1864C; CONF-810754-2) Avail: NTIS HC A02/MF A01

Atomic processes impact many of the interactions important to inertial confinement fusion. For example, ionization of bound electrons represent one of the primary stopping mechanisms for both ions and electrons. Atomic processes are also important in predicting the behavior of the very dense plasmas which are central to the success of inertial fusion. Atomic spectroscopy is an important diagnostic of ICF plasmas. DOE

N82-15875# Los Alamos Scientific Lab., N. Mex.
NEUTRINO NUMBER OF THE UNIVERSE
Edward W. Kolb 10 Aug. 1981 11 p refs Presented at the Intern. Conf. on Neutrino Phys. and Astrophys., Maui, Hawaii, 30 Jun. - 9 Jul. 1981 Submitted for publication
(Contract W-7405-eng-36)
(DE81-030249; LA-UR-81-2505; CONF-8106156-1) Avail: NTIS HC A02/MF A01

The influence of grand unified theories on the lepton number of the universe is reviewed. A scenario is presented for the generation of a large ($>>1$) lepton number and a small ($<<1$) baryon number. DOE

N82-15876# Los Alamos Scientific Lab., N. Mex.
INTERMEDIATE ENERGY PROTON AND LIGHT-ION SCATTERING
J. M. Moss 1981 13 p refs Presented at the 9th Intern. Conf. on High Energy Phys. and Nucl. Structure, Versailles, France, 6-10 Jul. 1981
(Contract W-7405-36)
(DE81-030115; LA-UR-81-2410; CONF-810747-4) Avail: NTIS HC A02/MF A01

Recent (1979-81) developments in the field of intermediate-energy proton and light-ion scattering from nuclei are reviewed with emphasis on theoretical and calculational techniques of particular interest to experimentalists. Topics covered include: nucleon-nucleon interactions; DWIA description of inelastic scattering; data-to-data analysis, giant resonances; Delta-isobar-hole configurations; pion-condensation precursors; measurement of the Q parameter; and spin-flip measurements. DOE

N82-15877# Brookhaven National Lab., Upton, N. Y.
SEARCH FOR THE VIOLATION OF TIME-REVERSAL INVARIANCE IN K MU SUB MU 3 DECAYS
W. M. Morse, L. B. Leipuner, R. C. Larsen, S. R. Blatt, M. K. Campbell, R. K. Adair, J. K. Black, H. Kasha, and M. P. Schmidt Aug. 1981 5 p refs Presented at the Intern. Conf. on High Energy Phys., Lisbon, 9 Jul. 1981 Submitted for publication
(Contract DE-AC02-76CH-00016)
(DE81-030557; BNL-30026; CONF-810760-1) Avail: NTIS HC A02/MF A01

From international conference on high energy physics Lisbon, Portugal (9 Jul 1981). The polarization of the Mu(+) from the decays K sub L yields Pi(-) Mu(+) Nu and K(+) yields Pi(o) Mu(+) Nu was measured. The transverse polarization forbidden by time reversal invariance is .00185 + or -.0036 based on the final data sample of thirty-four million events. This null result places constraints on certain models of charge-parity violation through the exchange of Higgs bosons. DOE

N82-15878# Brookhaven National Lab., Upton, N. Y.
POLARIZING MULTILAYER SPECTROMETER FOR NEUTRONS
C. F. Majkrzak, L. Passell, and A. M. Saxena 1981 8 p refs Presented at the Symp. on Neutron Scattering, Argonne, Ill., 12 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-029546; BNL-29922; CONF-810840-2) Avail: NTIS HC A02/MF A01

Polarizing neutron monochromators were prepared by sputtering thin film multilayers with d-spacings from 40 to 85 A on large float glass substrates. Peak reflectivities as great as 90% and polarizing efficiencies of 98% were measured. Increased angular acceptances were obtained by fabricating multilayers with multiple d-spacings. A planned polarized beam spectrometer which incorporates the multilayers and which has a variable energy resolution independent of angular beam divergence is described. DOE

N82-15879# Rochester Univ., N. Y. Dept. of Chemistry
STUDIES OF HEAVY-ION REACTIONS AND TRANSURANIC NUCLEI Progress Report, 1 Aug. 1980 - 31 Jul. 1981
J. R. Huizenga and W. U. Schroeder Jul. 1981 260 p refs
(Contract DE-AC02-76ER-03496)
(DE81-027980; DOE/ER-03496/T1) Avail: NTIS HC A12/MF A01

Mass and charge transport induced by nucleon exchange are examined. The parameters and dynamics for heavy ion collisions, heavy ion fusion and high energy reaction are also explored. For individual titles, see N82-15880 through N82-15886.

N82-15880# Rochester Univ., N. Y. Nuclear Structure Research Lab.
CORRELATED MASS AND CHARGE TRANSPORT INDUCED BY STATISTICAL NUCLEON EXCHANGE IN DAMPED NUCLEAR REACTIONS
W. U. Schroeder, J. R. Huizenga, and J. Randrup (Lawrence Berkeley Lab.) *In its* Studies of Heavy-Ion Reactions and Transuranic Nuclei Jul. 1981 p 6-18 refs (For primary document see N82-15879 06-72)
Avail: NTIS HC A12/MF A01

Experimental relations between mass, charge and energy loss of fragments from damped reactions in terms of an independent-particle transport model were analyzed. A quantitative description of data is achieved including the energy loss dependence of isobaric and isotopic fragment distributions. E.A.K.

N82-15881# Rochester Univ., N. Y. Nuclear Structure Research Lab.
DISSIPATIVE REACTION DYNAMICS OF HEAVY-ION COLLISIONS
W. U. Schroeder and J. R. Huizenga *In its* Studies of Heavy-Ion Reactions and Transuranic Nuclei Jul. 1981 p 20-46 refs (For primary document see N82-15879 06-72)
Avail: NTIS HC A12/MF A01

The transition from the very simple quasi-elastic to the vastly complex fusion type reactions involving up to several thousand nucleonic degrees of freedom was studied. Nuclear reactions induced by heavy ions at bombarding energies of a few MeV/u above the interaction barrier differ in several important ways from the more conventional processes observed with light projectiles such as protons, deuterons and alfa-particles. In light ion induced reactions two mechanisms are distinguished: (1) quasi-elastic pickup or stripping of one or a few nucleons and, (2) compound nucleus formation following the fusion of projectile and target nuclei. Heavy ion reactions constitute a reaction mechanism intermediate between quasi-elastic and fusion processes. These binary reactions, termed damped or deep inelastic collisions, arise because of the very strong repulsive Coulomb and centrifugal forces retarding or even inhibiting the fusion process. E.A.K.

N82-15882# Rochester Univ., N. Y. Nuclear Structure Research Lab.
A TWO DIMENSIONAL POSITION SENSITIVE DELTAE-E COUNTER FOR ENERGETIC LIGHT CHARGED PARTICLES
W. W. Wilcke, J. R. Birkelund, J. P. Kosky, H. J. Wollersheim, A. D. Hoover, J. R. Huizenga, W. U. Schroeder, L. E. Tubbs, and D. Hilscher (Hahn-Meitner Inst.) *In its* Studies of Heavy-Ion Reactions and Tranuranic Nuclei Jul. 1981 p 47-79 refs (For primary document see N82-15879 06-72)
Avail: NTIS HC A12/MF A01

A large area position sensitive deltaE-E detector for energetic

light charged particles is described. A single wire gas proportional counter is used as the deltaE-E detector. Two dimensional position readout is obtained from the proportional counter by a combination of charge division and electron drift time measurements. The detector is suitable for alpha particles with energies between 6.5 and 180 MeV. The application of the detector to study charged particle emission in a heavy ion induced reaction is discussed. E.A.K.

N82-15883# Rochester Univ., N. Y. Nuclear Structure Research Lab.

REACTION PARAMETERS FOR HEAVY-ION COLLISIONS

W. W. Wilcke, J. R. Birkelund, H. J. Wollersheim, A. D. Hoover, J. R. Huizwega, W. U. Schroeder, and L. E. Tubbs *In its* Studies of Heavy-Ion Reactions and Transuranic Nuclei Jul. 1981 p 81-106 refs (For primary document see N82-15879 06-72)

Avail: NTIS HC A12/MF A01

Reaction parameters for all combinations of 27 projectile and 16 target nuclei in a laboratory bombarding energy range of 1-50 MeV/u are presented. The reaction parameters are derived from the Fresnel model of heavy ion scattering, the droplet model and the rotating liquid drop model or from systematics of experimental data. E.A.K.

N82-15884# Rochester Univ., N. Y. Nuclear Structure Research Lab.

HEAVY-ION FUSION REVISITED

J. R. Huizenga, J. R. Birkelund, W. U. Schroeder, W. W. Wilcke, and H. J. Wollersheim *In its* Studies of Heavy-Ion Reactions and Transuranic Nuclei Jul. 1981 p 108-133 refs (For primary document see N82-15879 06-72)

Avail: NTIS HC A12/MF A01

Heavy ion fusion cross sections for a selected number of reactions are presented. For the lighter systems emphasis is placed on the high energy part of the fusion evaporation excitation functions. For lighter systems and not too high energies, the fusion process is experimentally rather well distinguishable because of the dominance of compound nucleus formation. For intermediate systems, fusion-fission competition begins to dominate over fusion evaporation for angular moments of approximately 65K. The experimental fusion-fission cross sections of the very heavy systems indicate that the topology of the underlying potential energy surface of relevance for the fusion process is not well approximated by a barrier in a one dimensional picture. A simple model description of fusion inhibition induced by the dynamical evolution along a neck degree of freedom is applied to a variety of fusion-fission excitation functions. The dependence of dynamical fusion inhibition on pertinent features of the multidimensional potential energy surface are also studied. E.A.K.

N82-15885# Rochester Univ., N. Y. Nuclear Structure Research Lab.

THE 209Bi + 136Xe REACTION AT E SUB LAB = 1422 MeV

H. J. Wollersheim, W. W. Wilcke, J. R. Birkelund, J. R. Huizenga, W. U. Schroeder, H. Freiesleben, and D. Hilscher *In its* Studies of Heavy-Ion Reactions and Transuranic Nuclei Jul. 1981 p 134-176 refs (For primary document see N82-15879 06-72)

Avail: NTIS HC A12/MF A01

Projectile like reaction products from the 209Bi + 136Xe reaction bombarding energy of 1422 MeV were studied. The fragments were identified by atomic number, and their kinetic energies and angular distributions were measured using three solid state deltaE-E telescopes. The angular distribution is peaked near the grazing angle. The minimum kinetic energy is bombarding energy independent and 150 MeV smaller than the Coulomb energy of touching spherical fragments which indicates a large deformation of these dinuclear systems. The measured element distributions for given Q-values are Gaussian and centered at the atomic number of the projectile. At large negative Q-values, the centeroids of the Gaussian distributions exhibit a small drift towards charge splits more asymmetric than the initial system. E.A.K.

N82-15886# Rochester Univ., N. Y. Nuclear Structure Research Lab.

THE 165Ho + 56Fe REACTION AT E SUB LAB = 462 MeV

A. D. Hoover, J. R. Birkelund, D. Hilscher, W. U. Schroeder, W. W. Wilcke, J. R. Huizenga, H. Breuer (Maryland Univ., College Park), A. C. Mignerey (Maryland Univ., College Park), V. E. Viola, Jr. (Indiana Univ., Bloomington), and K. L. Wolf (Argonne National Lab., Ill.) *In its* Studies of Heavy-Ion Reactions and Transuranic Nuclei Jul. 1981 p 178-258 refs (For primary document see N82-15879 06-72)

Avail: NTIS HC A12/MF A01

The Z-distributions measured as a function of angle and energy are discussed. The integrated fragment Z-distribution of the light reaction fragment is fairly broad and centered close to the charge of the projectile. The kinetic energy distribution extends from the quasi-elastic region down to energies smaller than the Coulomb energy of touching spherical nuclei. The angular distribution is peaked forward of the quarter point angle and rises at small angles which are due to orbiting. Charge distributions show an average drift towards larger asymmetry and an increase in width with increasing energy damping. The Coulomb barrier is considered for two choices of the scission radius. E.A.K.

N82-15887# Max-Planck-Institut fuer Stroemungsforschung, Goettingen (West Germany).

POTENTIAL DETERMINATION OF THE SYSTEM SODIUM (3 2P) PLUS MERCURY (6 1S) BY MEASURING AND ANALYZING THE RAINBOW SCATTERING IN THE SUPER-THERMAL ENERGY DOMAIN BETWEEN 0.3 AND 3.2eV Thesis - Georg-August-Univ. [POTENTIALBESTIMMUNG DES SYSTEMS Na (3 2P) + Hg (6 1S) DURCH MESSUNG UND ANSWERTUNG DER REGENBOGENSTREUUNG IM UEBERTHERMISCHEN ENERGIEBEREICH VON 0,7 BIS 3,2eV]

Lutz Huewel Dec. 1980 122 p refs In GERMAN (MPIS-23/1980; ISSN-0436-1199) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 20,65

The differential scattering cross section of the collision system Na (3 2 P) + Hg (6 1S) was determined, using rainbow oscillations. Electronically laser excited Na atoms were scattered by Hg and fluorescence was observed. The experimental setup consists basically of two (Na and Hg) atomic beams and an out of plane detection system. With a fast Na atomic beam, capable of reaching velocities above 5000 m/sec and providing collision energies of 3eV. Two well separated rainbow oscillatory systems were demonstrated in the differential scattering cross section. Both rainbow systems show strong amplitude dependence on the laser light polarization state. Author (ESA)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N82-15888# California Univ., Livermore. Lawrence Livermore Lab.

PROGRESS TOWARD FUSION ENERGY

Keith I. Thomassen 11 Mar. 1981 8 p Presented at the Energy in the Man-Built Environment: The Next Decade Specialty Conf., Vail, Colo., 3-5 Aug. 1981

(Contract W-7405-eng-48)

(UCRL-84974; CONF-810808-5) Avail: NTIS HC A02/MF A01

The basis for the present optimism in the magnetic fusion program is summarized. Some of the remaining tasks leading to a demonstration power reactor and the primary technologies necessary for that endeavor are described. DOE

N82-15889# Washington Univ., Seattle. Nuclear Physics Lab.

UNIVERSITY OF WASHINGTON NUCLEAR PHYSICS DATA COLLECTION SYSTEM

Kelly C. Green 1981 9 p Presented at the Topical Conf. on Computerized Data Acquisition in Particle and Nucl. Phys., Oak

Ridge, Tenn., 28 May 1981
(Contract DE-AC06-76ER-01388)
(DE81-028321; DOE/ER-01388/496; CONF-810523-11) Avail: NTIS HC A02/MF A01

A data collection system was developed, replacing a previous system based on an SDS-930 computer. The system is constructed about a PDP 11/60 and an MBD-11 controlled CAMAC crate. The hardware configuration as well as a locally written singles data collection code are described. Multiparameter data is taken with an enhanced version of Fermilab Multi. Current capabilities and future plans are discussed. DOE

N82-15890# California Univ., Berkeley. Lawrence Berkeley Lab. Nuclear Science Div.
POLYNOMIAL CHROMODYNAMICS
Herbert M. Ruck Jun. 1981 6 p refs Presented at the 5th High Energy Heavy Ion Study, Berkeley, Calif., 18-22 May 1981
(Contract W-7405-eng-48)
(DE81-028038; LBL-12872; CONF-8105104-6) Avail: NTIS HC A02/MF A01

A model of classical field theory with internal symmetry Z(3) is partially solved in 1 + 1 dimensions. The dynamical variables are two pairs of scalar and spinor fields phi sub 1, phi sub 2 and phi sub 1, phi sub 2. The phi and psi fields form composite finite-size particles. The mass spectrum and the interactions of these particles is studied. DOE

N82-15891# Battelle Pacific Northwest Labs., Richland, Wash.
FACTORS AFFECTING CRITICALITY FOR SPENT-FUEL MATERIALS IN A GEOLOGIC SETTING
B. F. Gore, U. P. Jenquin, and R. J. Serne Apr. 1981 210 p refs
(Contract DE-AC06-76RL-01830)
(DE81-029275; PNL-3791) Avail: NTIS HC A10/MF A01

The conditions required for the criticality of spent fuel constituents are determined. The calculational methods and computer codes used to determine critical conditions are described. Effects of the fissile content of spent fuel on criticality are examined. Pu quantities and concentrations are required for criticality without water were determined for various conditions of Pu separation, rock moderation and reflection, rock impurities, and isotopic content of the Pu. The possibility of geochemical processes separating Pu from other spent fuel constituents is addressed. Solubilities of U and Pu are calculated for groundwaters characteristic of basalt, tuff, granite, bedded and dome salt. Maximum concentrations which could be adsorbed on geologic media in contact with these groundwaters are then calculated. DOE

N82-15892# California Univ., Berkeley. Lawrence Berkeley Lab. Nuclear Sciences Div.
NON-LINEAR VACUUM POLARIZATION IN STRONG FIELDS
M. Gyulassy Jul. 1981 17 p refs Presented at the NATO-Advanced Summer Inst. Summer School on QED of Strong Fields, Lahnstein, W. Germany, 14 Jul. 1981
(Contract W-7405-eng-48)
(DE81-028039; LBL-12972; CONF-8106148-1) Avail: NTIS HC A02/MF A01

The Wichmann-Kroll formalism for calculating the vacuum polarization density to first order in alpha but to all orders in zeta alpha is derived. The most essential quantity is shown to be the electrons Green's function in these calculations. The method of constructing that Green's function in the field of finite radius nuclei is then presented. DOE

N82-15893# Department of Energy, Washington, D. C. Office of Energy Research.
TECHNOLOGY OF CONTROLLED NUCLEAR FUSION
F. H. Tenney, ed. and C. C. Hopkins, ed. Jul. 1981 644 p refs Proceedings of the 4th ANS Topical Meeting held at King of Prussia, Pa., 14-17 Oct. 1980 Sponsored in part by DOE, Washington, D.C. and EPRI
(DE81-027361; CONF-801011-Vol-3) Avail: NTIS HC A99/MF A01

An assessment of magnetically confined fusion power reactors, their technological use and applications, is made. The key engineering areas studied relate to: thermomechanics, thermohydraulics, electromagnetics, nucleonics, systems engineering, assembly, maintenance, repair, instrumentation and control of reactors and reactor materials. The subjects of safety factors, laser applications, and wall design are also addressed. M.D.K.

74 OPTICS

Includes light phenomena.

N82-15894*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OPTICAL INFORMATION PROCESSING FOR AEROSPACE APPLICATIONS
Dec. 1981 347 p refs Conf. held in Hampton, Va., 18-19 Aug. 1981
(NASA-CP-2207; L-15018) Avail: NTIS HC A15/MF A01 CSCL 20F

Current research in optical processing is reviewed. Its role in future aerospace systems is determined. The development of optical devices and components demonstrates that system concepts can be implemented in practical aerospace configurations. For individual titles, see N82-15895 through N82-15922.

N82-15895*# Air Force Office of Scientific Research, Bolling AFB, Washington, D.C.
AIR FORCE RESEARCH IN OPTICAL PROCESSING
John Neff *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 1-15 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Optical and optical electronic hybrid processing especially in the application area of image processing are emphasized. Real time pattern recognition processors for such airborne missions as target recognition, tracking, and terminal guidance are studied. S.L.

N82-15896*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EARTH FEATURE IDENTIFICATION FOR ONBOARD MULTISPECTRAL DATA EDITING: COMPUTATIONAL EXPERIMENTS
R. M. Aherron (Information and Control Systems, Inc., Hampton, Va.), R. F. Arduini (Computer Sciences Corp., Hampton, Va.), R. E. Davis, R. O. Huck, and S. K. Park *In its* Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 17-32 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

A computational model of the processes involved in multispectral remote sensing and data classification is developed as a tool for designing smart sensors which can process, edit, and classify the data that they acquire. An evaluation of sensor system performance and design tradeoffs involves classification rates and errors as a function of number and location of spectral channels, radiometric sensitivity and calibration accuracy, target discrimination assignments, and accuracy and frequency of compensation for imaging conditions. This model provides a link between the radiometric and statistical properties of the signals to be classified and the performance characteristics of electro-optical sensors and data processing devices. Preliminary computational results are presented which illustrate the editing performance of several remote sensing approaches. S.L.

N82-15897*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ROLE OF OPTICAL COMPUTERS IN AERONAUTICAL CONTROL APPLICATIONS
Robert J. Baumbick *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 33-43 (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 30F

The role that optical computers play in aircraft control is determined. The optical computer has the potential high speed capability required, especially for matrix/matrix operations. The optical computer also has the potential for handling nonlinear simulations in real time. They are also more compatible with

fiber optic signal transmission. Optics also permit the use of passive sensors to measure process variables. No electrical energy need be supplied to the sensor. Complex interfacing between optical sensors and the optical computer is avoided if the optical sensor outputs can be directly processed by the optical computer. S.L.

N82-15898*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
HIGH SPEED TECHNIQUES FOR SYNTHETIC APERTURE RADAR IMAGE FORMATION
Demetri Psaltis (California Inst. of Tech., Pasadena), Armand R. Tanguay, Jr. (Univ. of Southern California, Los Angeles), and Thomas J. Bicknell *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 47-52 (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

One possible approach to high speed synthetic aperture radar signal reconstruction involves the utilization of two dimensional real time spatial light modulators as recyclable replacements for photographic film in the input transducer plane of a modified synthetic aperture radar (SAR) coherent optical processor. Leading candidate spatial light modulators include modified Pockels readout optical modulators (PROM), charge coupled devices (CCD) addressed liquid crystal light valves, and CCD addressed membrane light modulators. The fundamental physical limitations affecting SAR processor performance characteristics of such real time devices are under investigation. Current research on PROM is focused on the effects of device operational mode, device constitutive parameters, electro-optic crystal orientation, writing wavelength, frame rate/data overwrite/presuming, erasure completeness, and image retention on the overall quality of SAR image formation. Both modulated laser scanning and intensified CRT temporal to spatial input approaches are being examined. S.L.

N82-15899*# Georgia Inst. of Tech., Atlanta.
OPTICAL IMPLEMENTATION OF SYSTOLIC ARRAY PROCESSING
H. J. Caulfield (Innovative Optics, Inc., Concord, Mass.), W. T. Rhodes (Carnegie-Mellon Univ.), M. J. Foster, and Sam Horvitz (Naval Underwater Systems Center, New London, Conn.) *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 53-60 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Algorithms for matrix vector multiplication are implemented using acousto-optic cells for multiplication and input data transfer and using charge coupled devices detector arrays for accumulation and output of the results. No two dimensional matrix mask is required; matrix changes are implemented electronically. A system for multiplying a 50 component nonnegative real vector by a 50 by 50 nonnegative real matrix is described. Modifications for bipolar real and complex valued processing are possible, as are extensions to matrix-matrix multiplication and multiplication of a vector by multiple matrices. S.L.

N82-15900*# Lockheed Electronics Co., Plainfield, N. J.
MATRIX VECTOR MULTIPLIER WITH TIME VARYING SINGLE DIMENSIONAL SPATIAL LIGHT MODULATORS
A. Tarasevich, N. Zeplin, and W. T. Rhodes (Georgia Inst. of Tech.) *In* NASA. Langley Research Center Opt. Inform. Process for Aerospace Appl. Dec. 1981 p 61-70 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

The applicability of iterative optical processors in environments requiring a short transient response time is analyzed. An approach is proposed utilizing acousto-optic single dimension light modulators where the matrix is the outer product of two vectors. The problems associated with a nonnegative real representation are addressed. A solution is proposed at some cost of processor speed. S.L.

N82-15901*# Environmental Research Inst. of Michigan, Ann Arbor. Radar and Optics Div.
INCOHERENT OPTICAL MATRIX-MATRIX MULTIPLIER
A. R. Dias *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 71-83 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Real time processing capabilities in the context of reconnaissance sensors, two dimensional beamforming, etc. are addressed. Matrix-matrix multiplier concepts using incoherent light are studied. S.L.

N82-15902*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
BULK AND INTEGRATED ACOUSTO-OPTIC SPECTROMETERS FOR RADIO ASTRONOMY
G. Chin, D. Buhl, and J. M. Florez *In* NASA. Langley Research Center Opt. Inform. Process for Aerospace Appl. Dec. 1981 p 85-91 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

The development of sensitive heterodyne receivers (front end) in the centimeter and millimeter range, and the construction of sensitive RF spectrometers (back end) enable the spectral lines of interstellar molecules to be detected and identified. A technique was developed which combines acoustic bending of a collimated coherent light beam by a Bragg cell followed by detection by a sensitive array of photodetectors (thus forming an RF acousto-optic spectrometer (AOS). An AOS has wide bandwidth, large number of channels, and high resolution, and is compact, lightweight, and energy efficient. The thrust of receiver development is towards high frequency heterodyne systems, particularly in the millimeter, submillimeter, far infrared, and 10 micron spectral ranges. S.L.

N82-15903*# Grumman Aerospace Corp., Bethpage, N.Y.
ENERGY NORMALIZATION OF TV VIEWED OPTICAL CORRELATION (AUTOMATED CORRELATION PLANE ANALYZER FOR AN OPTICAL PROCESSOR)
Alex Grumet *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 93-104 (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

An automatic correlation plane processor that can rapidly acquire, identify, and locate the autocorrelation outputs of a bank of multiple optical matched filters is described. The read-only memory (ROM) stored digital silhouette of each image associated with each matched filter allows TV video to be used to collect image energy to provide accurate normalization of autocorrelations. The resulting normalized autocorrelations are independent of the illumination of the matched input. Deviation from unity of a normalized correlation can be used as a confidence measure of correct image identification. Analog preprocessing circuits permit digital conversion and random access memory (RAM) storage of those video signals with the correct amplitude, pulse width, rising slope, and falling slope. TV synchronized addressing of 3 RAMs permits on-line storage of: (1) the maximum unnormalized amplitude, (2) the image x location, and (3) the image y location of the output of each of up to 99 matched filters. A fourth RAM stores all normalized correlations. A normalization approach, normalization for cross correlations, a system's description with block diagrams, and system's applications are discussed. M.D.K.

N82-15904*# Carnegie-Mellon Univ., Pittsburgh, Pa. Dept. of Electrical Engineering.
ITERATIVE OPTICAL VECTOR-MATRIX PROCESSORS (SURVEY OF SELECTED ACHIEVABLE OPERATIONS)
David Casasent and Charles Neuman *In* NASA. Langley Research Center Opt. Inform. Process for Aerospace Appl. Dec. 1981 p 105-118 refs Sponsored in part by AFOSR (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

An iterative optical vector-matrix multiplier with a microprocessor-controlled feedback loop capable of performing a wealth of diverse operations was described. A survey and description of many of its operations demonstrates the versatility and flexibility of this class of optical processor and its use in diverse applications. General operations described include: linear difference and differential equations, linear algebraic equations, matrix equations, matrix inversion, nonlinear matrix equations, deconvolution and eigenvalue and eigenvector computations. Engineering applications being addressed for these different operations and for the IOP are: adaptive phased-array radar, time-dependent system modeling, deconvolution and optimal control. M.D.K.

N82-15905*# Harry Diamond Labs., Adelphi, Md.
INTERFEROMETRIC SURFACE-WAVE ACOUSTO-OPTIC TIME-INTEGRATING CORRELATORS
Norman J. Berg, Irwin J. Abramovitz, and Michael W. Casseday *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 119-129 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

A structure for a coherent-interferometric acousto-optic (AO) time-integrating correlator was implemented by using a single surface acoustic wave (SAW) device with tilted transducers to reduce intermodulation terms. The SAW device was fabricated on Y-Z LiNbO3 with a center frequency of 175 MHz, a bandwidth of 60 MHz, and a time-aperture of about 10 micros. The density of the photodetector array, with a potential of 120 MHz. Typical integration times are 30 to 40 ms, providing processing gains in excess of 10 to the 6th power. Such a device is useful in providing fast synchronization of communication links and in demodulating to base band and simultaneously acting as a synchronization lock monitor for moderate data rates. Where processing may be limited by Doppler shifts, a two dimensional architecture was implemented to allow full processing gain. Two one-dimensional, SAW AO time-integrating correlators and a two dimensional correlator are evaluated. M.D.K.

N82-15906*# Naval Research Lab., Washington, D. C.
THREE METHODS FOR PERFORMING HANKEL TRANSFORMS
R. A. Athale, H. H. Szu, and J. N. Lee *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 133-144 (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Three methods for performing Hankel transforms with optical or digital processors are described. The first method is applicable when the input data is available in Cartesian (x-y) format and uses the close connection between generalized Hankel transform and the two dimensional Fourier transform in Cartesian coordinates. The second method is useful when the input data is in polar (r - theta) format and uses change of variables to perform the nth order Hankel transform as a correlation integral. The third method utilizes the von Neumann addition theorem for Bessel functions to extract the Hankel coefficients from a correlation between the radial part of the input and a Bessel function. Initial experimental results obtained for optical implementation of the first two methods are presented. M.D.K.

N82-15907*# California Univ., San Diego. Dept. of Electrical Engineering and Computer Sciences.
OPTICAL RECOGNITION OF STATISTICAL PATTERNS
Sing H. Lee *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 145-166 refs Sponsored by NSF and AFOSR (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Optical implementation of the Fukunaga-Koontz transform (FKT) and the Least-Squares Linear Mapping Technique (LSLMT) is described. The FKT is a linear transformation which performs image feature extraction for a two-class image classification problem. The LSLMT performs a transform from large dimensional feature space to small dimensional decision space for separating multiple image classes by maximizing the interclass differences while minimizing the intraclass variations. The FKT and the LSLMT were optically implemented by utilizing a coded phase optical processor. The transform was used for classifying birds and fish. After the F-K basis functions were calculated, those most useful for classification were incorporated into a computer generated hologram. The output of the optical processor, consisting of the squared magnitude of the F-K coefficients, was detected by a T.V. camera, digitized, and fed into a micro-computer for classification. A simple linear classifier based on only two F-K coefficients was able to separate the images into two classes, indicating that the F-K transform had chosen good features. Two advantages of optically implementing the FKT and LSLMT are parallel and real time processing. M.D.K.

N82-15908*# Honeywell, Inc., Bloomington, Minn.
OPTICAL SPATIAL INTEGRATION METHODS FOR AMBIGUITY FUNCTION GENERATION
P. N. Tamura, J. J. Rebholz, O. T. Daehlin, and T. C. Lee *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 167-172 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

A coherent optical spatial integration approach to ambiguity function generation is described. It uses one dimensional acousto-optic Bragg cells as input tranducers in conjunction with a space variant linear phase shifter, a passive optical element, to generate the two dimensional ambiguity function in one exposure. Results of a real time implementation of this system are shown. M.D.K.

N82-15909*# Hughes Research Labs., Malibu, Calif.
THE INTEGRATED OPTIC RF SPECTRUM ANALYZER
M. E. Pedinoff, T. R. Ranganath, T. R. Joseph (Hughes Aircraft Co., Fullerton, Calif.), and J. Y. Lee (Hughes Aircraft Co., Carlsbad, Calif.) *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 173-208 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

The results of measurements made on a fully integrated optic RF spectrum analyzer (IOSA) are reported. The performance of the device acousto-optic bandwidth, single-tone RF resolution, two-tone RF resolution, single-tone dynamic range, two-tone dynamic range, and single-tone RF response are presented. The device parameters that control device performance are analyzed. These results demonstrate the viability of the IOSA for real time spectrum analysis of pulsed and CW RF signals. Improvements of RF bandwidth resolution can be obtained by the use of larger collimated optical beams which requires larger optical lens elements, and hence, larger crystals. Author

N82-15910*# Battelle Columbus Labs., Ohio.
APPLICATIONS OF ELECTRO-OPTIC GRATINGS IN INTEGRATED OPTICAL SIGNAL PROCESSING DEVICES
Carl M. Verber *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 209-215 refs Sponsored in part by AFOSR (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

A variety of applications of electro-optically induced Bragg gratings in integrated optical signal processing and computation devices are shown. The gratings are easy to fabricate, operate efficiently on relatively low voltages and have design principles which are well known and reliable. The component allows a rapid and efficient interaction with an optical wave in a planar electro-optic waveguide. The operation of such gratings and their use as intensity modulators, spatial light modulators, and components in correlators and in a variety of computational units is described. M.D.K.

N82-15911*# Virginia Univ., Charlottesville.
FOUR- AND FIVE-LAYER SILICON-CLAD DIELECTRIC WAVEGUIDES
Glen McWright and T. E. Batchman *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 217-230 refs (For primary document see N82-15894 06-74) (Grant NsG-1567)
Avail: NTIS HC A15/MF A01 CSCL 20F

Computer modeling studies conducted on four-layer silicon-clad dielectric waveguides indicate that the attenuation (alpha) and mode index (beta/K) behave as exponentially damped sinusoids as the silicon thickness is increased. The observed effect can be explained quite simply as a periodic coupling between the guided modes of the lossless structure and the lossy modes supported by the high-refractive index silicon. The attenuation and mode index are significantly altered by conductivity changes in the silicon; an amplitude modulator and an intensity modulator were proposed using these results. Predicted high attenuations in the device may be reduced significantly with a silicon dioxide buffer layer between the semiconductor and the polystyrene guide. Experimental confirmation of the predicted characteristics is still necessary. A number of thin-silicon film waveguides have been RF sputtered but attenuation measurements to verify the damped oscillatory behavior are forthcoming. Conductivity variations of the silicon should demonstrate the modulation capabilities. Author

N82-15912*# Army Armament Research and Development Command, Dover, N. J.
CO2 LASER WAVEGUIDING IN PROTON IMPLANTED GaAs
H. A. Jenkinson and D. C. Larson (Drexel Univ.) *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 231-240 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Surface layers capable of supporting optical modes at 10.6 microns have been produced in n-type GaAs wafers through 300 keV proton implantation. The dominant mechanism for this effect appears to be free carrier compensation. Characterization of the implanted layers by analysis of infrared reflectivity spectra and synchronous coupling at 10.6 microns produced results in good agreement with elementary models. These results of sample characterization by infrared reflectivity and by CO2 laser waveguiding as implanted are presented and evaluated. M.D.K.

N82-15913*# Honeywell, Inc., Bloomington, Minn.
AlGaAs/GaAs TRANSVERSE JUNCTION STRIPE LASERS WITH DISTRIBUTED FEEDBACK
M. J. Hafich, R. A. Skogman, P. E. Petersen, and H. Kawanishi (Kogakuin Univ.) *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 241-250 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Transverse junction stripe (TJS) lasers with periodic feedback were fabricated in two geometries. An interferometric and wet chemical etching technique was used to create a feedback grating across the entire pumping region for the distributed feedback (DFB) TJS laser and to create the separate distributed Bragg reflectors/DBR) for the TJS/DBR laser. The TJS/DFB laser was a double heterostructure device grown by liquid phase epitaxy (LPE) and had a third order grating etched in the top ALO. 2GaO. 8As layer. The grating was buried by growing an ALO.35GaO.65As layer on the grating by metal organic chemical vapor deposition (MO-CVD). The TJS/DBR laser was also fabricated in an LPE double heterostructure. The top AlGaAs layer was thinned to 0.1 micron over more than half of the laser so that the grating would be close to the GaAs active layer and optical field. Single mode operation in both configurations was obtained. The thermal shift of the laser wavelength in both cases was less than 1 Angstrom/deg K, compared to the 3 Angstrom/deg K shift of the spontaneous emission peak.
N.W.

N82-15914*# Battelle Columbus Labs., Ohio.
EVAPORATED As2S3 LUNEBURG LENSES FOR LiNbO3:Ti OPTICAL WAVEGUIDES
James R. Busch, Van E. Wood, Richard P. Kenan, and Carl M. Verber *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 251-261 refs Sponsored in part by AFOSR (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Luneburg lenses of good quality were formed on high index optical waveguides by evaporation of arsenic trisulfide glass through simple masks. Using only two thin circular aperture masks, lenses with focal spots of a few times the diffraction limited width at f/4 were obtained. These lenses were designed for and tested at both visible (633 nm) and infrared wavelengths. Procedures for the design, fabrication, and testing of lenses of this type are described. N.W.

N82-15915*# Hazeltine Corp., Greenlawn, N. Y.
A BROADBAND RF CONTINUOUSLY VARIABLE TIME DELAY DEVICE
Frederick W. Freyre *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 265-274 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

A method for implementation of continuously variable time delay of broadband RF signals is described. The method uses Bragg Cell and optical heterodyne technology. The signal to be delayed is applied to the Bragg Cell acoustic transducer, and the delay time is the acoustic transit time from this transducer to the incident light beam. By translating the light beam, the delay is varied. Expressions describing the Bragg Cell diffraction, lens Fourier transformation, and the optical heterodyne processes are developed. Specifications for the variable delay including bandwidth, range of delay, and insertion loss are provided. Applications include radar signal processing, spread spectrum intercept, radar ECM, and adaptive array antenna processing.
N.W.

N82-15916*# Cornell Univ., Ithaca, N. Y.
MONOLITHICALLY INTEGRATED ACTIVE OPTICAL DEVICES
J. Ballantyne, D. K. Wagner, B. Kushner, and S. Wojtzcuk *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 275-289 refs Sponsored in part by NSF (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Considerations relevant to the monolithic integration of optical detectors, lasers, and modulators with high speed amplifiers are discussed. Some design considerations for representative subsystems in the GaAs-AlGaAs and GaInAs-InP materials systems are described. Results of a detailed numerical design of an electro-optical birefringent filter for monolithic integration with a laser diode is described, and early experimental results on monolithic integration of broadband MESFET amplifiers with photoconductive detectors are reported. N.W.

N82-15917*# Massachusetts Inst. of Tech., Cambridge. Dept. of Electrical Engineering and Computer Science.
MICROCHANNEL SPATIAL LIGHT MODULATOR
Cardinal Warde *In* NASA. Langley Research Center Opt. Inform. Process for Aerospace Appl. Dec. 1981 p 291-298 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

The Microchannel Spatial Light Modulator (MSLM), a versatile, highly sensitive, and optically addressed device being developed for real time optical information processing is discussed. The MSLM operates by converting an input optical image into a charge distribution at the surface of an electro-optic crystal. The charge distribution generates an electric field which modulates the refractive index of the crystal and thereby the phase or intensity of an image readout beam. Prototype devices employing 250 micron thick crystals exhibited a spatial resolution of 5 cycles/mm at 50% contrast, an exposure sensitivity of 2.2 nJ/cu cm and framing rates of 40 Hz with full modulation depth. The image processing operations that have been achieved using the internal processing mode of the MSLM include contrast reversal, contrast enhancement, edge enhancement, image addition and subtraction, analog and digital intensity thresholding, and binary level logic operations such as AND, OR, EXCLUSIVE OR, and NOR. N.W.

N82-15918*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INFRARED FIBER OPTIC FOCAL PLANE DISPERSERS
John H. Goebel *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 301-308 refs (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Far infrared transmissive fiber optics as a component in the design of integrated far infrared focal plane array utilization is discussed. A tightly packed bundle of fibers is placed at the focal plane, where an array of infrared detectors would normally reside, and then fanned out in two or three dimensions to individual detectors. Subsequently, the detectors are multiplexed by cryogenic electronics for relay of the data. A second possible application is frequency up-conversion (v sub 1 + v sub 2 = v sub 3), which takes advantage of the nonlinear optical index of refraction of certain infrared transmissive materials in fiber form. Again, a fiber bundle is utilized as above, but now a laser of frequency v sub 1 is mixed with the incoming radiation of frequency v sub 1 within the nonlinear fiber material. The sum, v sub 2 is then detected by near infrared or visible detectors which are more sensitive than those available at v sub 2. Due to the geometrical size limitations of detectors such as photomultipliers, the focal plane dispersal technique is advantageous for imaging up-conversion. N.W.

N82-15919*# Honeywell, Inc., Bloomington, Minn.
E-BEAM GENERATED HOLOGRAPHIC MASKS FOR

OPTICAL VECTOR-MATRIX MULTIPLICATION
Steven M. Arnold and Steven K. Case (Minnesota Univ., Minneapolis) *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 309-317 (For primary document see N82-15894 06-74)
(Contract F49620-80-C-0029)
Avail: NTIS HC A15/MF A01 CSCL 20F

An optical vector matrix multiplication scheme that encodes the matrix elements as a holographic mask consisting of linear diffraction gratings is proposed. The binary, chrome on glass masks are fabricated by e-beam lithography. This approach results in a fairly simple optical system that promises both large numerical range and high accuracy. A partitioned computer generated hologram mask was fabricated and tested. This hologram was diagonally separated outputs, compact facets and symmetry about the axis. The resultant diffraction pattern at the output plane is shown. Since the grating fringes are written at 45 deg relative to the facet boundaries, the many on-axis sidelobes from each output are seen to be diagonally separated from the adjacent output signals. N.W.

N82-15920*# Minnesota Univ., Minneapolis. Dept. of Electrical Engineering.
MULTIFACET HOLOGRAPHIC OPTICAL ELEMENTS
Steven K. Case and Paul R. Haugen *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 319-325 refs (For primary document see N82-15894 06-74)
(Grant DAA29-81-K-0033)
Avail: NTIS HC A15/MF A01 CSCL 20F

New types of holographic optical elements, combining the flexibility of computer generated holograms with the large space bandwidth product and high diffraction efficiency of interferometrically recorded volume phase holograms, are demonstrated. The optical elements are recorded by subdividing a volume hologram film surface into numerous small areas (facets), each of which is individually exposed under computer control. Each facet is used to produce a portion of the desired final wavefront. Three different optical elements are demonstrated. N.W.

N82-15921*# Syracuse Univ., N. Y. Dept. of Electical and Computer Engineering.
A LIQUID CRYSTAL ADAPTIVE LENS
Stephen T. Kowel and Dennis S. Cleverly (GE, Utica, N.Y.) *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 329-339 refs (For primary document see N82-15894 06-74)
(Contract DAAK70-80-0053)
Avail: NTIS HC A15/MF A01 CSCL 20F

Creation of an electronically controlled liquid crystal lens for use as a focusing mechanism in a multi-element lens system or as an adaptive optical element is analyzed. Varying the index of refraction is shown to be equivalent to the shaping of a solid refracting material. Basic characteristics of liquid crystals, essential for the creation of a lens, are reviewed. The required variation of index of refraction is provided by choosing appropriate electrode voltages. The configuration required for any incoming polarization is given and its theoretical performance in terms of modulation transfer function derived. N.W.

N82-15922*# Sperry Univac, St. Paul, Minn.
MANIPULATION OF LIGHT WITH MAGNETO-OPTIC STRIPE DOMAIN FIELDS
E. J. Torok, F. G. Hewitt, J. A. Drawczak, and G. L. Nelson *In* NASA. Langley Research Center Opt. Inform. Process. for Aerospace Appl. Dec. 1981 p 341-350 refs Sponsored in part by Army Research Office (For primary document see N82-15894 06-74)
Avail: NTIS HC A15/MF A01 CSCL 20F

Magnetic diffraction grating materials, being developed to provide a simple means of deflecting light in a two dimensional, solid state fashion are discussed. The most promising material, for several applications, appears to be bismuth substituted iron garnet films in epitaxial form. Calculations indicate that deflection efficiency greater than 60% is possible in the near infrared region of the spectrum. Within the field of view of the deflector, measurements predict that 105 resolvable spots can be expected. Applications include: (1) general purpose deflection of free laser light, (2) image processing of extended sources such as transparencies, (3) programmable lensing, and (4) fiber optic matrix switching. N.W.

N82-15923# Fraunhofer-Inst. fuer Productionstechnik und Automatisierung, Stuttgart (West Germany).
INVESTIGATION OF A COHERENT OPTICAL METHOD FOR ROUGHNESS MEASUREMENTS Final Report, Dec. 1979
Norbert Rau Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 58 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-065; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fahinformationszentrum, Karlsruhe, West Germany DM 12,20

When a surface is illuminated with coherent or partial coherent light, the reflected light shows a structure in the intensity distribution. There are defined statistical quantities dependent on the surface roughness and surface properties. Computing models were constructed to describe the correlation between the speckle pattern and the roughness. The sum of the experimental examinations is to form a dependence of the statistical quantities in the speckle pattern on the surface so that a characteristic line for the determination of the roughness can be determined. Several light sources with different coherent properties were inserted and various technical surfaces were investigated. T.M.

N82-15924# Zeiss (Carl), Oberkochen (West Germany).
CONSTRUCTION OF A NUMERICALLY CONTROLLED DEVICE FOR ALIGNING OPTICAL AND MECHANICAL AXIS OF A MICROSCOPE LENS ON A LATHE Final Report
Hans-Joachim Juranek Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 12 p In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-033; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 2,50

In microscope manufacturing lenses are normally cemented in special mounts. The optical axis is aligned to the mechanical axis by a turning operation on a special lathe. Solutions to automate this process are presented. T.M.

N82-15925# Preussag A.G. Metall, Goslar (West Germany). Arbeitsgebiet Rohstoffe.
AN INVESTIGATION INTO THE APPLICABILITY OF THERMAL INFRARED SCANNING FOR EXPLORATION Final Report, Feb. 1981
Heribert Broicher Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 18 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-087; ISSN-0340-7608) Avail: NTIS HC A02/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 3,80

Pratt's theory of thermal inertia stripping lead to thermal inertia calculations for subsurface zones subjected to diurnal and annual temperature variations, as well as to temperatures at the zone limits. Thermal inertia mapping after separating these zones gains in importance for exploration since forebodies might cause detectable subsurface temperature anomalies. T.M.

N82-15926# AEG-Telefunken, Heilbronn (West Germany). Geschaeftsbereich Halbleiter.
OPTOELECTRONICS: MATERIALS QUALITY AND DEVICE DEVELOPMENT Final Report, Jun. 1980
Klaus Berchtold Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 46 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-093; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,70

By using specific process modifications, different sources of degradation were separately investigated and analyzed. The investigations were carried out using GaP as a test vehicle and were later extended to other LED materials. A new degradation mechanism was discovered. Two procedures for an automatic

mounting technique were developed. The simultaneous mounting technique allows a reduction of mounting time by a factor of 4. Using the one side mounting technique the wire bond processes can be omitted. A selective liquid phase epitaxy process for small area infrared emitters was developed, which makes it possible to grow GaAs layers on small isolated areas. Using a flip chip technique with the p-layer facing downwards, one side contacted monolithic 50 element arrays on transparent substrates (GaP) were developed in the colors green and orange. These arrays exhibit extremely low crosstalk. T.M.

N82-15927# Agfa-Gevaert A.G., Munich (West Germany). Phototechnik.

DEVELOPMENT OF OPTICAL PLASTICS Final Report, Oct. 1980

Helmut Duerr, Carl Heynemann, Guenter Kirchhof, and Hans Hespe (Bayer AG) Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 47 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-T-81-121; ISSN-0340-7608) Avail: NTIS HC A03/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 9,90

A large range of thermoplastics with differing optical qualities is required for the calculation of new plastic lenses. Commonly-known general correlations between structure and refractive value, as well as pre-testing of over 300 compounds formed the basis for a selection of 3 product groups for optimisation. The iterative improvements made to these materials through experimental injection molding and by measuring further physical material ratings led to: a thermoplastic with n greater than 1.6; 4 thermoplastics with optical data between those of PMMA and PS or PC; and material which combines a low refractive value with relatively high optical dispersion. T.M.

N82-15928# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.

HIGH RESOLUTION X-RAY IMAGER Final Report

Hans Hartmann and Peter Predehl Bonn Bundesministerium fuer Forschung und Technologie Oct. 1981 82 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie

(BMFT-FB-W-81-042; ISSN-0170-1339) Avail: NTIS HC A05/MF A01

A laboratory model of a high resolution X-ray imaging detector was developed and constructed. The detector is suitable as a focal plane instrument for an X-ray telescope for astronomical observations. The detector will be used to test such telescopes in the laboratory. The X-ray photons are detected through photoconversion and secondary multiplication by two cascaded microchannel plates. Position determination is accomplished by means of a crossed grid charge collector. The operation of this detector as well as its development are described. The theory of charge division by a resistance-coupled wire grid is discussed in detail. A theory of the sensitivity of the detector for soft X-rays is developed and is in good agreement with measurements. M.G.

N82-15929# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany). Inst. fuer Physik der Atmosphaere.

THE OPTICAL RECOGNITION OF SURFACE TARGETS AS A FUNCTION OF SURROUNDING, TARGET AND OBSERVATION PARAMETERS IN AIR TO SURFACE OBSERVATIONS [DIE OPTISCHE ERFASSUNG VON LANDZIELEN IN ABHAENGIGKEIT VON UMGEBUNGS-, ZIEL- UND BEOBACHTUNGSPARAMETERN BEI BEOBACHTUNGEN LUFT-LAND]

Hans-Eberhard Hoffmann Bonn Bundesministerium der Verteidgung 1981 54 p refs In GERMAN; ENGLISH summary

(BMVG-FBWT-81-8) Avail: NTIS HC A04/MF A01; DOK-ZENTBW, Bonn DM 30

The visibility ranges 'maximum detection range' and 'maximum recognition range' were determined when observing air to ground. Both a 1.5 t truck and a Leopard 1 battle tank were used as land targets. The determination of observation values and the measurements of environmental parameters were carried out from helicopter Bell UH 1D. On the basis of the results obtained during these field tests, the influence of the following parameters on visibility ranges is shown: degree of turbidity of the atmosphere, background, illumination, direction of observation, flight altitude, environmental brightness (as environmental parameters); dimension of target, movement of target (as target parameters); and naked eye, field-glasses, light-intensifier, limitation of field of view (as observation parameters). Author

N82-15930# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Wesseling (West Germany). Inst. fuer Physik der Atmosphaere.

THE OPTICAL RECOGNITION OF SEA TARGETS AS A FUNCTION OF SURROUNDING AND OBSERVATION PARAMETERS IN AIR TO WATER OBSERVATIONS

Hans-Eberhard Hoffmann Bonn Bundesministerium der Verteidigung 1981 41 p refs In GERMAN; ENGLISH summary

(BMVG-FBWT-81-10) Avail: NTIS HC A03/MF A01; DOK-ZENTBW, Bonn DM 30

The influence of environmental and observation parameters on visibility ranges, maximum detection range, and maximum identification range were determined. The determination of the visibility ranges and the measurements of environmental parameters took place from helicopters. On the basis of the test results the influence of the following parameters on visibility ranges is shown: visual range, illumination, flight altitude, and environmental brightness as environmental parameters; and naked eye, light-intensifier, night goggles, limitation of field of view as observation parameters. T.M.

N82-15931# Photometrics, Inc., Woburn, Mass.

EVALUATION OF INFRARED SIMULATION DATA Final Report, 1 Dec. 1979 - 31 Oct. 1980

Irving L. Kofsky, Dennis P. Villanucci, and Randall B. Sluder 26 Nov. 1980 126 p refs

(Contract DNA001-80-C-0010)

(AD-A105872; PHM-04-80; DNA-5521F) Avail: NTIS HC A07/MF A01 CSCL 18/3

Sounding rocket and aircraft data on atmospheric IR/optical radiations resulting from natural and artificial inputs of energy that simulate high-altitude nuclear explosions are evaluated and interpreted. Data from the HIRIS 2 and EXCEDE spectral rockets and the 1979-80 auroral missions of AFGL's optical aircraft are addressed. Author

N82-15932# Brookhaven National Lab., Upton, N. Y. National Synchrotron Light Source.

NATIONAL SYNCHROTRON LIGHT SOURCE IN THE INFRARED REGION

Gwyn P. Williams 1981 14 p refs Presented at the 2nd Natl. Conf. on Synchrotron Radiation Instr., Ithaca, N.Y., 15-17 Jul. 1981

(Contract DE-AC02-76CH-00016)

(DE81-030037; BNL-29884; CONF-810750-4) Avail: NTIS HC A02/MF A01

A discussion of the utilization of the national synchrotron light source (NSLS) in the 1 to 100 micron infrared spectral region is presented. A comparison is made of the respective brightness of the NSLS and of black body sources. The way in which each source may be utilized with a monochromator is discussed and comparative slit brightnesses are calculated for selected cases. DOE

N82-15933# California Univ., Livermore. Lawrence Livermore Lab.

X-RAY MICROSCOPY USING GRAZING INCIDENCE REFLECTION OPTICS

Robert H. Price 6 Aug. 1981 13 p refs Presented at the Topical Conf. on Low Energy X-ray Diagnostics, Livermore, Calif., 8-10 Jun. 1981

(Contract W-7405-eng-48)

(DE81-028160; UCRL-86046; CONF-810651) Avail: NTIS HC A02/MF A01

The Kirkpatrick-Baez microscopes are decribed along with their role as the workhorse of the X-ray imaging devices. This role is being extended with the development of a 22X magnification Kirkpatrick-Baez X-ray microscope with multilayer X-ray

mirrors. These mirrors can operate at large angles, high X-ray energies, and have a narrow well defined X-ray energy bandpass. Where a large solid angle is needed, the Woelter microscope will still be necessary and the technology needed to build them will be useful for many other typs of X-ray optics. DOE

N82-15934# Sandia Labs., Albuquerque, N. Mex.
CONTINUOUSLY VARIABLE ELECTROOPTIC FILTER
J. B. Whitley, R. E. Cuthrell, and D. M. Mattox 1981 4 p refs Presented at the SPIE Intern. Symp., San Diego, Calif., 24 Aug. 1981
(Contract DE-AC04-76DP-00789)
(DE81-025393; SAND-81-0580C; CONF-810810-7) Avail: NTIS HC A02/MF A01

A PLZT electrooptic filter being used to control the intensity of light transmitted to a video camera from samples undergoing pulsed electron beam thermal testing is discussed. This electron beam test system is part of a materials development program for fusion energy applications. During the testing, sample surface temperatures may reach 3000 C and the intense light from these pulses is potentially damaging to the camera. The use of a variable density electrooptic filter prevents this damage and provides improved image quality during rapid changes of surface temperature. DOE

N82-15935# Brookhaven National Lab., Upton, N. Y.
FINE-GRAINED HODOSCOPES BASED ON SCINTILLATING OPTICAL FIBERS
S. R. Borenstein (City College of City of New York) and R. C. Strand 1981 12 p refs Presented at CESRII Workshop, Ithaca, N.Y., 18 Jun. 1981
(Contract DE-AC02-76CH-00016)
(DE81-029316; BNL-29923; CONF-8106150-1) Avail: NTIS HC A02/MF A01

In order to exploit the high event rates at ISABELLE, it is necessary to have fast detection with fine spatial resolution. A prototype fine-grained hodoscope, the elements of which are scintillating optical fibers, is currently being constructed. The fibers were drawn from commercially available plastic scintillator which has been clad with a thin layer of silicone. It was demonstrated with one mm diameter fibers that with a photo-detector at each end, the fibers are more than 99% efficient for lengths of about 60 cm. The readout will be accomplished either with small diameter photomultiplier tubes or avalanche photodiodes (APD) used either in the linear or Geiger mode. The program of fiber development and evaluation is described. The status of the APD as a readout element is discussed, and an optical encoding readout scheme is described for events of low multiplicity. DOE

N82-15936# Brookhaven National Lab., Upton, N. Y.
APPLICATIONS OF BENT CYLINDRICAL MIRRORS TO X-RAY BEAMLINES
S. M. Heald Jul. 1981 11 p refs Presented at the 2nd Natl. Conf. on Synchrotron Radiation Instrumentation, Ithaca, N.Y., 15 Jul. 1981
(Contract DE-AC02-76CH-00016)
(DE81-029918; BNL-29940; CONF-810750-5) Avail: NTIS HC A02/MF A01

Bent cylindrical mirrors are considered as substitutes for paraboloidal and ellipsoidal mirrors in X-ray beamlines. Analytic and raytracing studies are used to compare their optical performance with the corresponding ideal elements. Particular emphasis is placed on obtaining the practical limitations in the application of bent cylinders to typical beamline configurations. DOE

N82-15937# Los Alamos Scientific Lab., N. Mex.
OPTICAL ANALYSIS AND ALIGNMENT APPLICATIONS USING THE INFRARED SMARTT INTERFEROMETER
V. K. Viswanathan, P. D. Bolen, I. Liberman (Westinghouse Research and Development Center), and B. D. Seery (TRW, Inc., Redondo Beach, Calif.) 1981 7 p refs Presented at the Conf. on Optics '81, Los Alamos, N. Mex., 6 Apr. 1981
(Contract W-7405-eng-36)
(DE81-030257; LA-UR-81-2468; CONF-810429-38) Avail: NTIS HC A02/MF A01

The possibility of using the infrared Smartt interferometer for optical analysis and alignment of infrared laser systems has been discussed previously. In this paper, optical analysis of the Gighwatt Test Facility at Los Alamos, as well as a deformable mirror manufactured by Rocketdyne, are discussed as examples of the technique. The possibility of optically characterizing, as well as aligning, pulsed high energy laser systems like Helios and Antares is discussed in some detail. DOE

N82-15938# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Allgemeine Elektrotechnik und Angewandte Elektronik.
TRANSPARENT GaAlAs LUMINESCENT DIODES FOR OPTICAL WAVELENGTH MULTIPLEXING [TRANSPARENTE GaAlAs-LUMINESZENZDIODEN FUER OPTISCHEN WELLENLAENGENMULTIPLEXBETRIEB]
W. Proebster Bonn Bundesministerium der Verteidigung 1979 69 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium der Verteidigung
(BMVg-FBWT-79-18) Avail: NTIS HC A04/MF A01; DOK-ZENTBw, Bonn DM 30

Gallium aluminum arsenide light emitting diodes (LED) are evaluated. The emission wavelength is determined by the aluminum content of the active region. A multiplex transmitter unit was constructed, consisting of a GaInAs LED emitting at 1.06 microns and of a transparent GaAlAs LED. The long wavelength light signal of the GaINAs LED is coupled through the transparent GaAlAs LED into the transmission fiber by means of a short connection fiber. Since the transmission fiber is directly coupled to the GaAlAs LED, light signals of 0.8 microns and 1.06 microns are simultaneously transmitted. The light power in the transmission fiber and the modulation bandwiths of the LED's (200 Mhz for the GaInAs LED and 100 Mhz for the GaAlAs LED) allow for a high transmission capacity. Author (ESA)

N82-15939# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.
THEORETICAL STUDY OF IMAGE SPOTS WITH THE WIDE FIELD CAMERA AND THE IMPLICATIONS FOR NEBULAR SPECTROGRAPHY [ETUDE THEORIQUE DES TACHES IMAGES DE LA CAMERA GRAND CHAMP ET DU SPECTROGRAPHE NEBULAIRE]
J. Y. LeGall Sep. 1981 46 p In FRENCH
(LAS-OPT.INST-03-81) Avail: NTIS HC A03/MF A01

A Schmidt camera onboard Spacelab is considered. The operating spectral domain (120 to 350 nm) necessitates an optical correction for differential aberrations in function of view angle. A computer program (CASSE-TETE) is adapted. Coefficients of asphericity for a deformed mirror are calculated. Test spectrographs were made for 66 deg field of view at various wavelengths. The program CASSE-TETE gives spot diagrams similar to mirror manufacturer ones. It is appropriate for determining the optimal position of the mirror where image spots are as small as possible. Author (ESA)

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N82-15940# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
SPACE-RESOLVED MEASUREMENTS OF NEUTRONS AND IONS EMITTED BY A PLASMA FOCUS [ORTSAUFGELOESTE MESSUNGEN ZUR NEUTRONEN- UND IONENEMISSION AM PLASMAFOKUS]
U. Jaeger May 1980 101 p refs In GERMAN
(IPF-80-8) Avail: NTIS HC A06/MF A01

Space-resolved measurements of neutrons and of accelerated charged particles emitted by a plasma focus device are presented. The neutron source was measured with one and two dimensional paraffin collimators. The spatial resolution is 5 mn along the axis and the radius, with a time resolution of 10 ns. In order to make quantitative statements about the neutron yield, neutron scattering, absorption, and nuclear reactions were taken into account. Part of the neutron measurement was carried out together with time and space resolved measurements of the electron

density to study possible correlations between n sub e and y sub n. Author

N82-15941# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.

LOWER HYBRID RF HEATING EXPERIMENTS IN THE MIT ALCATOR A, C AND VERSATOR II TOKAMAKS

M. Porkolab, J. Schuss, Y. Takase, K. I. Chen, S. Knowlton, S. Luckhardt, and S. McDermott 1980 12 p refs Presented at the 2nd Joint Varenna-Grenoble Intern. Symp. on Heating of Toroidal Plasmas, Como, Italy, 3-12 Sep. 1980

(Contract DE-AS02-78ET-53076)

(DE81-028193; CONF-800932-9) Avail: NTIS HC A02/MF A01

Experimental results on lower hybrid heating in the Alcator A and the Versator-2 Tokamaks with power levels up to 90 kW are presented. In Alcator A, a double waveguide grill, and in Versator 2, a 4 waveguide grill with arbitrary phasing are used. Also, a 6 waveguide grill experiment in Versator 2 is described which launches a traveling wave aimed at driving toroidal currents. The forthcoming lower hybrid heating experiment in Alcator C, utilizing four 4 x 4 waveguide arrays with power levels up to 4 MW, is also described. DOE

N82-15942*# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.

CONSTANCE MIRROR PROGRAM: PROGRESS AND PLANS

Robert E. Klinkowstein, Michael E. Mauel, James H. Irby, Louis D. Smullin, and Steven H. Voldman 3 Mar. 1981 89 p refs

(Grant NsG-1323; Contracts DE-AC02-78ET-51013; DE-AS02-78ET-53076; N00014-77-C-0641; ET-78-C-02-4687; F49620-79-C-0200)

(NASA-CR-164804; DE81-029962; DOE/ET-51013/5; PFC/RR-81-3) Avail: NTIS HC A05/MF A01 CSCL 20I

The current state of the mechanics of the Constance II experiment, the physics results gathered, the motivation background, and future plans for the Constance II experiment are reviewed. Several improvements have been made and several experimental investigations have been completed. These include the construction/installation/testing of: (1) liquid-nitrogen cooled, Ioffe bars installed, (2) a diverter coil (3) the 100 kW ICRF generator, (4) the data acquisition system, and (5) the optimum hot-iron operation of the machine with Titanium and pulsed-gas plasma guns. Measurements were made of the density, temperature, and radius of the plasma. Ion-cyclotron fluctuations were observed, their bandwidth measured, and data collected demonstrating resonance heating. New X-ray diagnostics were designed and purchased, and progress on the Thomson scattering was made. Finally, a new hot cathode gun was designed and constructed. M.D.K.

N82-15943# Wisconsin Univ., Madison. Nuclear Engineering Dept.

MAGNETIC CONFINEMENT FUSION PLASMA THEORY Annual Progress Report, 14 Ju. 1980 - 31 Dec. 1981

J. D. Callen Jul. 1981 17 p refs

(Contract DE-AC02-80ER-53104)

(DE81-029789; DOE/ET-53104/1) Avail: NTIS HC A02/MF A01

Research that concentrated on some key magnetic mirror confinement physics questions (pyrophase diffusion, alpha particle losses, and coil misalignment effects) and on a fairly comprehensive development of neoclassical transport in rippled Tokamaks and stellarators, including effects due to a boundary layer, energy smoothing, an electric field, direct particle loss and helical trapping is reported. Some minor projects on tandem mirror boundary layers, kinetic effects on rippling modes in the edge of a Tokamak, and ballooning modes in tandem mirrors, the large Octupole, and stellarators are also addressed. DOE

N82-15944# Wisconsin Univ., Madison. Plasma Physics Group.

EQUILIBRIUM AND STABILITY OF EXPERIMENTAL HIGH BETA TOROIDAL PLASMAS

S. C. Prager 1981 12 p Presented at the 23rd Ann. Meeting of the Div. of Plasma Phys. of the APS, New York, N.Y., 12-16 Oct. 1981

(Contract DE-AS02-76ET-53051)

(DE81-023610; DOE/ET-53051/24; CONF-811028) Avail: NTIS HC A02/MF A01

The beta limit to the stability of average minimum-beta plasmas remains unknown for all such confinement concepts. The strength of nonMHD effects was demonstrated in a study of the equilibrium and stability properties of high beta plasmas. A wide range of stable high beta plasmas were created from beta = approximately 8% to 35%, 2 to 9 times the single fluid ballooning instability beta limit of 4%. No beta related fluctuations were observed in magnetic field, density, or electrostatic potential. Since the critical parameter for instability onset is diamagnetic current density, not beta, the observed stability at beta = 35% may be understandable. Measurements are underway to detect the equilibrium Pfirsch-Schlueter current that flows parallel to the magnetic field. The injection of 3.8 MW of auxiliary heating (2 MW ion cyclotron heating and 1.8 MW neutral beam) to enlarge the high beta parameter space is in progress. DOE

N82-15945# Texas Univ., Austin. Dept. of Physics.

BREAKDOWN IN THE PRETEXT TOKAMAK Ph.D. Thesis

Jay F. Benesch Jun. 1981 83 p refs

(Contract DE-AS05-77ET-53042)

(DE81-029362; DOE/ET-53042/2; FRCR-226) Avail: NTIS HC A05/MF A01

Data are presented on the application of ion cyclotron resonance RF power to preionization in Tokamaks. A 0.3-3 kW at 12 MHz was applied to hydrogen and a visible discharge was obtained but no scaling of breakdown voltage was found with any parameter that was varied. A possible explanation for this, which implies that higher RF power would have been much more effective, is discussed. Finally, the investigation of the dV/dt dependence of breakdown voltage in PRETEXT, a phenomenon also seen in JFT-2 is presented. The breakdown is discussed in terms of the physics of Townsend discharges. DOE

N82-15946# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.

NONLINEAR STEADY-STATE COUPLING OF LH WAVES

K. Ko and V. B. Krapchev Feb. 1981 8 p refs Presented at the 4th Topical Conf. on Radio Frequency Plasma Heating, Austin, Tex., 9 Feb. 1981

(Contract DE-AC02-78ET-51013)

(DE81-029435; DOE/ET-51013/11; PFC/RR-81-9; CONF-810214-9) Avail: NTIS HC A02/MF A01

The coupling of lower hybrid waves at the plasma edge by a two waveguide array with self-consistent density modulation is solved numerically. For a linear density profile, the governing nonlinear Klein-Gordon equation for the electric field can be written as a system of nonlinearly modified Airy equations in Fourier k sub z space. Numerical solutions to the nonlinear system satisfying radiation condition are obtained. Spectra broadening and modifications to resonance cone trajectories are observed with increase of incident power. DOE

N82-15947# Massachusetts Inst. of Tech., Cambridge. Plasma Fusion Center.

LH WAVE ABSORPTION BY MODE CONVERSION NEAR ION CYCLOTRON HARMONICS

K. Ko, A. Bers (REQ, Varennes, Quebec), and V. Fuchs Feb. 1981 8 p refs Presented at the 4th Topical Conf. on Radio Frequency Plasma Meeting, Austin, Tex., 9 Feb. 1981

(Contract DE-AC02-78ET-51013)

(DE81-029434; DOE/ET-51013/10; CONF-810214-8; PFC/RR-81-8) Avail: NTIS HC A02/MF A01

Numerical studies of the dispersion relation near the lower hybrid frequency in an inhomogeneous plasma (delta n, delta T, delta B) show that portions of an incident lower hybrid wave spectrum undergo successive but partial mode conversions to warm plasma waves in the presence of ion cyclotron harmonics. Wave absorption beyond the first mode conversion occurs near an ion cyclotron harmonic where ion Landau damping is enhanced. A second order dispersion relation numerically in good agreement with the full dispersion relation in the mode conversion region is derived using the condition variation in D/variation in k = 0. The mode conversion efficiency at each confluence is evaluated by solving the corresponding differential equation.DOE

N82-15948# California Univ., Livermore. Lawrence Livermore Lab.
HYDROGEN PRODUCTION BASED ON MAGNETIC FUSION
Oscar H. Krikorian 17 Aug. 1981 7 p Presented at the Intern. Energy Agency Ann. 1 Workshop on Thermochem. Hydrogen, Julich, W. Germany, 23-25 Sep. 1981
(Contract W-7405-eng-48)
(DE81-029636; UCRL-86600; CONF-810942-1) Avail: NTIS HC A02/MF A01

A brief summary of the status of tandem mirror reactor blanket design studies as an energy source for thermochemical cycles is given. A joule-boosted decomposer concept for SO3 decomposition is discussed. Some of the details of the thermodynamics of boiling of the H2SO4 azeotrope and the enthalpy of the resulting vapor as a function of temperature are included. DOE

N82-15949# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
DESIGN OF 24.8-KW, 3.8 K CRYOGENIC SYSTEM FOR ISABELLE
D. P. Brown, M. Afrashteh, J. A. Bamberger, A. Fresco, A. P. Schlafke, W. J. Schneider, J. Sondericker, A. Werner, and K. C. Wu 1981 6 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10-14 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030555; BNL-30013; CONF-810835-20) Avail: NTIS HC A02/MF A01

ISABELLE will consist of two proton accelerator/storage rings in a common tunnel. There will be 1084 superconducting magnets installed in the 3.8 km circumference tunnel. The protons will be accelerated to an energy of 400 GeV in each ring and stored for 24 hours. The two beams are counter-rotating and intersect at six places around the ring. The particles which emerge from proton interactions at these intersecting points are studied using various types of detectors. DOE

N82-15950# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
TRANSIENT RESPONSE OF A THERMAL BUFFER: A STUDY FOR ISABELLE
W. J. Schneider 1981 8 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10-14 Aug. 1981
(DE81-030549; BNL-30008; CONF-810835-23) Avail: NTIS HC A02/MF A01

The design and transient response of a buffer for use during cooldown of ISABELLE is discussed. Introduction of an insensitive thermal mass of the inlet of a sextant ahead of the first semiconducting magnets is considered. DOE

N82-15951# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
HEAT-LOAD MEASUREMENT OF PROTOTYPE CRYOGENIC MAGNETS AND LEADS FOR THE ISABELLE PROJECT
A. P. Werner, D. P. Brown, and W. J. Schneider 1981 8 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10-14 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030550; BNL-30010; CONF-810835-24) Avail: NTIS HC A02/MF A01

A major feature in the cryogenic system development program for ISABELLE is the measurement of the heat loads of prototypical hardware. In particular, superconducting magnet assemblies, magnet power leads and magnet power lead vessels have been measured. In each of these cases it has been possible to build equipment which has a heat load equal to or less than the allowance for it in the heat load budget. DOE

N82-15952# Brookhaven National Lab., Upton, N. Y. Accelerator Dept.
MAGCOOL: THE PRODUCTION COOLING FACILITY FOR ISABELLE MAGNETS
J. A. Bamberger, M. Afrashteh, D. P. Brown, W. J. Schneider, J. H. Sondericker, and K. C. Wu 1981 8 p refs Presented at the Cryogenic Eng. Conf., San Diego, Calif., 10-14 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030554; BNL-30011; CONF-810835) Avail: NTIS HC A02/MF A01

The ISABELLE proton accelerator uses over one thousand superconducting magnets to guide the particle beams in two circular rings, 3.8 km in circumference. Prior to their installation in the tunnel, all magnets must be tested and measured at their 3.8 K operating temperature. The refrigeration system, called MAGCOOL, which accomplishes this task is described. DOE

N82-15953# Brookhaven National Lab., Upton, N. Y.
THERMAL CONDUCTIVITY MEASUREMENTS OF INSULATORS FOR FUSION BLANKETS
F. L. Horn, J. A. Fillo, and J. R. Powell 1981 5 p refs Presented at the Fusion Reactor Mater. Meeting, Seattle, 9 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030028; BNL-29779; CONF-810831-50) Avail: NTIS HC A02/MF A01

Alumina-silica mat (8 lb/cu ft) varied in thermal conductivity in air and Ar from 0.06 W/m- K at 300 C to 0.22 W/m- K at 1000 C, but in He it increased to 0.24 W/m- K at 300 C and 0.54 W/m- K at 1000 C, while in steam it was about midway between these values. The carbon and graphite felts behaved similarly, but the rigid and denser (24 lb/cu ft) zirconia fiberboard exhibited superior insulating properties: 0.07 W/m- K at 300 C and 0.14 W/m- K at 1000 C in air and Ar, and 0.13 W/m- K at 300 C and 0.17 W/m- K at 1000 C in steam, but rising to 0.15 W/m- K at 300 C and 0.49 W/m- K at 1000 C in He. The lighter zirconia felt (14 lb/cu ft) in steam at 1000 C was thought to be best at 0.23 W/m- K and only 0.40 W/m- K in He at 1000 C. DOE

N82-15954# Los Alamos Scientific Lab., N. Mex.
ULTRA-HIGH-DENSITY PLASMA EXPERIMENTS: MHD SIMULATIONS
J. H. Brownell, I. R. Lindemuth, T. A. Oliphant, and D. L. Weiss Aug. 1981 6 p refs Presented at the 10th European Conf. on Controlled Fusion and Plasma Phys., Moscow, 14-19 Sep. 1981
(Contract W-7405-eng-36)
(DE81-030244; LA-UR-81-2572; CONF-810906-8) Avail: NTIS HC A02/MF A01

High density, laser initiated, gas embedded Z pinch experiments which are being performed at Los Alamos are being treated computationally using a two dimensional magnetohydrodynamic computer code. All aspects of the experiment are modeled including the laser optics system, the Marx bank/transmission line, electron avalanching, and the experimental diagnostics. Experimental observations have been reproduced very well. DOE

N82-15955# General Atomic Co., San Diego, Calif.
ALGORITHMS DEVELOPED TO OBTAIN PARTICULAR NUMERICAL SOLUTIONS TO THE IDEAL MHD EQUILIBRIUM PROBLEM
T. S. Wang and F. J. Helton Jul. 1981 31 p refs Presented at the European Workshop on the Behavior of Magnetically-Confined Plasma, Wildhaus, Switzerland, 9 Sep. 1981 Submitted for publication
(Contract DE-AT03-76eT-51011)
(DE81-029891; GA-A-16400; CONF-810947-3) Avail: NTIS HC A03/MF A01

The determination of axially symmetric magnetohydrodynamic (MHD) equilibria with free plasma-vacuum interface requires the solution of a two dimensional, elliptic, nonlinear partial differential equation. The shape of the boundary is not specified but is determined as the nonlinear response nor uniqueness of solution is quaranteed for this nonlinear elliptic free-boundary problem. In this paper we discuss algorithms developed to obtain particular numerical solution to the MHD equilibrium problem. These algorithms have been divided into two categories, those involving current initialization and those involving feedback stabilization. DOE

N82-15956# General Atomic Co., San Diego, Calif.
CURRENT DRIVEN NONIDEAL INSTABILITY IN A FORCE-FREE TOROIDAL PLASMA
M. S. Chu, F. J. Helton, J. K. Lee, R. W. Moore, J. M. Greene, and T. H. Jensen Jul. 1981 27 p refs Presented at the

European Workshop on the Behavior of Magnetically-Confined Plasmas, Wildhaus, Switzerland, 9 Sep. 1981
(Contract DE-AT03-76ET-51011)
(DE81-029892; GA-A-16418; CONF-810947-2) Avail: NTIS HC A03/MF A01

The problem of the current-driven linear instability of a general force free equilibrium has been formulated in terms of a variational problem with the vector potential as the trial function. The formalism allows A x B sub 0 not equal to 0 so that nonideal effects are modeled. The variational problem studied numerically for both infinite aspect ratio and finite aspect ratio Tokamaks. Results of these numerical studies are presented.
DOE

N82-15957# General Atomic Co., San Diego, Calif.
GATO: AN MHD STABILITY CODE FOR AXISYMMETRIC PLASMAS WITH INTERNAL SEPARATRICES
L. C. Bernard, F. J. Helton, and R. W. Moore Jul. 1981 19 p refs Presented at the European Workshop on the Behavior of Magnetically-Confined Plasmas, Wildhaus, Switzerland, 9 Sep. 1981 Submitted for publication
(Contract DE-AT03-76ET-51011)
(DE81-029889; GA-A-16441; CONF-810947-1) Avail: NTIS HC A02/MF A01

The GATO code computes the growth rate of ideal magnetohydrodynamic instabilities in axisymmetric geometries with internal separatrices such as doublet and expanded spheromak. The basic method, which uses a variational principle and a Galerkin procedure to obtain a matrix eigenvalue problem, is common to the ERATO and PEST codes. A new coordinate system has been developed to handle the internal separatrix. Efficient algorithms have been developed to solve the matrix eigenvalue problem for matrices of rank as large as 40,000. Further improvement is expected using graph theoretical techniques to reorder the matrices. Using judicious mesh repartition, the marginal point can be determined with great precision. The code has been extensively used to optimize doublet and general Tokamak plasmas.
DOE

N82-15958# Kernforschungsanlage, Juelich (West Germany). Inst. fuer Plasmaphysik.
AN ESTIMATE OF CONVECTION COOLING IN THE BOUNDARY LAYER OF TOROIDAL FUSION PLASMAS
G. H. Wolf Jul. 1980 18 p refs In GERMAN; ENGLISH summary
(Juel-1666; ISSN-0366-0885) Avail: NTIS HC A02/MF A01

By means of a simple model, the boundary layer plasma temperature T in toroidal fusion plasmas was estimated, supposing that the heating power transmitted to a toroidally confined plasma is eventually carried away by convective plasma flow in the boundary layer. The value of T is critical as regards plasma-wall interaction and heat loading of limiters and divertors. The boundary layer of thickness delta fills the interspace between the outermost closed magnetic surface and the first wall which encloses the plasma column toroidally. The model requires that delta is equal to or larger than (10 exp 15)/n cm, n being the average boundary plasma density. The model connects the total heating power with average values of the plasma parameters T and n in the boundary layer and of the angle epsilon which gives the direction of the plasma flow towards the wall. The values of epsilon and delta can be controlled by the field configuration of the magnetic limiter. This results in an estimate of T in front of the first wall (for epsilon xn = 10 exp 12 cm exp (-3) and using the parameters of the Tokamaks Textor and Intot, T is on the order of 10 eV or lower).
Author (ESA)

N82-15959# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
A COMPILATION OF RAYLEIGH CROSS SECTIONS FOR THE LASER DIAGNOSTICS OF PLASMAS
K. Hirsch Oct. 1980 28 p refs In GERMAN; ENGLISH summary
(IPF-80-10) Avail: NTIS HC A03/MF A01

Fundamental notions of scattering, polarization, and cross sections were reviewed. The experimental scattering and detection set-up is described. Rayleigh data for nine gases were derived which are in excellent agreement with theoretical calculations. Together with established data from the literature, these results are compiled in tables and graphs of differential and total cross sections, ratio of Thomson to Rayleigh cross sections, and equivalent electron density.
Author (ESA)

N82-15960# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
ENERGY ANALYSIS OF FAST IONS FROM PLASMA FOCUS DISCHARGES
A. Mozer Sep. 1980 120 p refs In GERMAN; ENGLISH summary
(IPF-80-11) Avail: NTIS HC A06/MF A01

A Thomson parabola spectrometer was developed and used for energy and mass analysis of the fast ions emitted by a plasma focus. The design of the spectrometer, the detection system using cellulose nitrate films error analysis, and the calibration and test procedure are described. Besides deuterons, results reveal the presence in the emitted flux of highly ionized impurity ions which attain energies up to 18 MeV. Their energy distribution is consistent with acceleration in an electric field reaching 4 MV/mm. The deuteron distribution is shown to depend on the filling pressure. Besides use as an intense neutron source, the plasma focus can be used as a heavy ion accelerator provided the heavy ion yield can be increased.
Author (ESA)

N82-15961# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
RELATION BETWEEN NEUTRON PRODUCTION AND INSTABILITIES IN A PLASMA FOCUS [UEBER DEN ZUSAMMENHANG ZWISCHEN NEUTRONENPRODUKTION UND INSTABILITAETEN AM PLASMAFOKUS]
B. Rueckle Jan. 1981 100 p refs In GERMAN
(IPF-81-1) Avail: NTIS HC A05/MF A01

The macroscopically recognizable circumstances and requirements for a strong neutron emission from a plasma focus were experimentally studied. It was necessary to simultaneously employ many diagnostic techniques with high space and time resolution. A ten channel N2 laser interferometer was developed for the investigation of plasma density is described. Magnetic probes and scintillator multipliers were also used. Neutron and X-ray emissions are connected with the m=o (m=azimuthal periodicity) pinch instabilities at the end of the discharge. The relation of neutron production to the m=o instability is examined. Detail observations show that neutron production is most probably due to a beam-target mechanism. Due to microinstabilities, the plasma resistance is abnormally high during reexpansion after m=o instabilities and concomitant deuteron production is observed.
Author (ESA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N82-15962# Washington Univ., St. Louis, Mo. Semiconductor Research Lab.
THE 2-4-52 CHALCOPYRITES FOR HIGH SPEED DEVICES Annual Report, 1 Jun. 1980 - 31 May 1981
C. M. Wolfe, G. A. Davis, and S. Julie Hsieh 31 Jul. 1981 48 p refs
(Grant AF-AFOSR-0096-79; AF Proj. 2306)
(AD-A106107; Rept-59457-3; AFOSR-81-0646TR) Avail: NTIS HC A03/MF A01 CSCL 20/2

An open-tube, sliding-boat, liquid-phase system has been used to grow ZnxCd(1-x)SnP2 epitaxially on InP substrates. X-ray diffraction measurements indicate that this alloy grows on (100) substrates with the lattice-matched a-axis in the growth plane and the c-axis in the growth direction. Unintentionally-doped layers have electron concentrations as high as 3 time 10 to the -19th power cu cm with mobility values of about 2,000 sq cm/V sec. These mobility values are substantially larger than have been obtained in the equivalent III-V materials at similar concentrations. Attempts to grow ZnGeAs2 epitaxially on GaAs substrates with a Zn-Ge-AsCl3 and a Zn-GeCl4-Ge-As4 vapor-phase system have met with little success. Although the first system gives good control over the As flux and the second over Ge, reproducible results have not been achieved in either

system. Our experience with these methods, however, indicates that most of the reproducibility problems can be overcome with a Zn-GeCl4-AsCl3 reactor. We are currently investigating this method. Calculations are presented on the I-V characteristics of a space-charge limited diode. If the electrons exhibit inertial motion (are not scattered), then they will quickly reach nonparabolic regions of the conduction band. When this nonparabolicity is taken into account, the current appears ohmic rather than exhibiting a V to the 3/2 power behavior, as has been previously supposed. GRA

N82-15963# Washington Univ., St. Louis, Mo. Semiconductor Research Lab.

IMPURITY AND DEFECT INTERACTIONS IN GaAs Annual Technical Report, 1 Aug. 1980 - 31 Jul. 1981

C. M. Wolfe, P. A. Fedders, G. E. Stillman, Camellia M. L. Yee, and R. T. Green 30 Sep. 1981 50 p refs

(Contract N00014-80-C-0762; RR0210203)

(AD-A106106; Rept-64422-1) Avail: NTIS HC A03/MF A01 CSCL 20/2

The construction of an epitaxial reactor to examine the basic aspects of complex formation in GaAs has been completed. This reactor is designed to simultaneously dope the growing layer with a donor impurity and Cr and/or O so that impurity interaction regions are obtained in the same sample. We are currently calibrating this system for several dopants. The redistribution of Cr during the annealing of uniform and ion-implanted bulk samples has been examined. Preliminary results indicate that the Cr build-up at the surface can be modified by applying an electric field to the surface during the annealing process. With the availability of high-purity GaAs from a variety of epitaxial growth techniques, improved donor identifications have been made by far infrared photoconductivity measurements. Samples grown by AsCl3-H2 VPE, AsCl3-N2 VPE, AsH3 VPE, LPE, MBE, and MOCVD have been examined and the common residual donors have been identified. GRA

N82-15964# University of Southern California, Los Angeles. Dept. of Chemistry.

PREPARATION AND MOLECULAR AND CRYSTAL STRUCTURE OF TRANS-R.S.-(Cr(2, 3, 2-TET)(NCS)2) NCS

Helmut R. Maeecke, Bernard F. Mentzen, Jean Pierre Puax, and Arthur W. Adamson 17 Sep. 1981 33 p refs Submitted for publication

(Contract N00014-76-C-0548; NR Proj. 051-601)

(AD-A105595; TR-17) Avail: NTIS HC A03/MF A01 CSCL 07/3

The complex Cr(2,3,2-tet)(NCS)2 NCS was prepared by a route expected to yield the cis form, namely by stereoretentive substitution of thiocyanate for chloride in cis-Cr(2,3,2-tet) Cl2(+). Crystal structure determination shows however, that it is the trans-isomer that actually is obtained. The structure determination was by X-ray single crystal analysis. The thiocyanate complex crystallizes in the monoclinic p sub 2 lc space group with a = 8.153 (2), b = 15.556 (2), and c = 14.175 (2) a, and dot beta = 99.84 (2). There are four formula units per unit cell. The structure was solved by the heavy-atom method, and full-matrix least squares refinement led to a final value of the R(R sub w) index of 0.0295 (0.0332) based on 2380 unique reflectors. The chromium atom is hexacoordinated and the six nitrogen atoms form a slightly distorted octahedron with a nearly planar CrN4 unit. The use of visible and infrared spectroscopy for isomer identification is discussed for the case of thiocyanate containing metal amine complexes. GRA

N82-15965# Naval Postgraduate School, Monterey, Calif.

A STUDY OF THE UNIPOLAR ARCING DAMAGE MECHANISM ON SELECTED CONDUCTORS AND SEMICONDUCTORS M.S. Thesis

Franklin Terrence Ryan and Stephen Tucker Shedd Jun. 1981 125 p refs

(AD-A105791) Avail: NTIS HC A06/MF A01 CSCL 20/12

A broad investigation, experimental and theoretical, of the mechanism of unipolar arcing has been conducted. A theoretical discussion of existing unipolar arc models is presented. Experimental and theoretical evidence is used to support the Schwirzke-Taylor Model at the expense of other models. Three current models of arc motion are examined and refuted. Experimental results show that Aluminum and various steels arc heavily, Molybdenum and Nickel to a lesser extent, and commercially prepared metallic glasses not at all. The semi-conductors showed some arcing on Germanium but none on Silicon. Experiments showed that grain boundaries play no significant role in unipolar arc initiation. Experiments were conducted in which a laser produced metallic glass is exposed to the plasma produced by the same laser pulse. The results are used to refute the microwhisker explosion models of unipolar arc initiation. GRA

N82-15966# State Univ. of New York, Stony Brook. Dept. of Physics.

POSSIBLE APPLICATIONS OF THE STEERING OF CHARGED PARTICLES BY BENT SINGLE CRYSTALS

R. A. Carrigan, Jr. (Fermi National Accelerator Lab.), W. M. Gibson, C. R. Sun, and E. N. Tsyganov (Joint Inst. for Nuclear Research, Moscow) Batavia, Ill. Fermi National Accelerator Lab. 1981 14 p refs Presented at the 9th Intern. Conf. on Atomic Collisions in Solids, Lyon, 6-10 Jul. 1981

(Contract DE-AC02-76CH-03000)

(DE81-028601; FERMILAB-CONF-81-50-EXP; CONF-810728-5) Avail: NTIS HC A02/MF A01

Some aspects of the steering of charged particles using channeling in bent crystals are reviewed. Crystal angular and spatial acceptance, deflection dechanneling, and radiation damage are discussed. Examples of possible bent transport, focusing, the possibility of charm particle separated beams, and magnetic moment determination. DOE

N82-15967# California Univ., Berkeley. Lawrence Berkeley Lab.

SMALL-ANGLE X-RAY SCATTERING SYSTEM WITH LINEAR POSITION-SENSITIVE DETECTOR

A. R. Forouhi, B. Sleaford, V. Perez-Mendez, D. deFontaine, and J. R. Fordor (Spectrolabs, Inc., Sylmar, Calif.) Apr. 1981 11 p refs Presented at the IEEE Symp. on Nucl. Sci., San Francisco, 21-23 Oct. 1981

(Contract W-7405-eng-48; Grant NSF DMR-79-20405)

(DE81-021920; LBL-12587; CONF-811012-1) Avail: NTIS HC A02/MF A01

A linear position-sensitive detector has been constructed for use in small-angle X-ray scattering experiments. It is a one dimensional, pressurized gas-filled detector with a delay line read out. Calculated efficiency of the detector at 8.04 keV and 45 psi for ArCH4 filling is 60%, and for Xe-CO2 filling is 90% limited only by the thickness of the entrance beryllium window. Inherent reslution of the detector is 0.1 mm for normal incident X-rays. The overall resolution of the detection system is determined by the width and angular divergencies of the point collimated CU K/sub alpha/ beam used in the experiment. The performance of the system is described in terms of measurements on Al-Zn alloy samples. DOE

N82-15968# Massachusetts Inst. of Tech., Cambridge. Dept. of Chemistry.

DEPOPULATION RATES FOR COMBUSTION-RELATED SPECIES IN LONG-LIVED VIBRATIONALLY OR ELECTRONICALLY EXCITED LEVELS Technical Progress Report, 15 Jan. - 15 Jul. 1981

Robert W. Field and James L. Kinsey 1981 9 p refs

(Contract DE-AC02-81ER-10831)

(DE81-030042; DOE/ER-10831/1) Avail: NTIS HC A02/MF A01

Measures of molecular properties and the techniques and instrumentation used to obtain them are considered. The feasibility of using stimulated emission pumping to study the intramolecular and intermolecular energy redistribution processes is examined. Laser induced fluorescence from an acetylene is discussed. DOE

N82-15969# California Univ., Berkeley. Lawrence Berkeley Lab. Materials and Molecular Research Div.

EFFECTS OF REAGENT TRANSLATIONAL AND VIBRATIONAL ENERGY ON THE DYNAMICS OF ENDOTHERMIC REACTIONS

D. Krajinovich, Z. Zhang, F. Huisken, Y. R. Shen, and Y. T. Lee Jul. 1981 15 p refs Presented at the 12th IPEAC Intern. Conf. on the Phys. of Electron. and Atomic Collisions, Gatlingburg, Tenn., 15-22 Jul. 1981

(Contract W-7405-eng-48)
(DE81-028122; LBL-12982; CONF-810754-1) Avail: NTIS HC A02/MF A01

The endothermic reactions Br + CH3I yields CH3 + IBr (delta H sub zero = 13 kcal/mole) and Br + CF3I yields CF3 + IBr (delta H sub zero = 11 kcal/mole) were studied by the crossed molecular beams method. Detailed center of mass contour maps of the IBr product flux as a function of recoil velocity and scattering angle are derived. For both systems it is found that the IBr product is sharply backward scattered with respect to the incident Br direction, and that most of the available energy goes into product translation. Vibrational enhancement of the Br + CF3I reaction was investigated by using the infrared multiphoton absorption process to prepare highly vibrationally excited CF3I. At a collision energy of 31 kcal/mole (several times the barrier height), reagent vibrational energy appears to be less effective than an equivalent amount of (additional) translational energy in promoting reaction. More forward scattered IBr is produced in reactions of Br with vibrationally hot CF3I. DOE

N82-15970# Edgerton, Germeshausen and Grier, Inc., Idaho Falls, Idaho.

INTEGRAL-CAPTURE MEASUREMENTS AND CROSS-SECTION ADJUSTMENTS FOR Nd, Sm, AND Eu

R. A. Anderl, F. Schmittroth (Hanford Engineering Development Lab.), and Y. D. Harker · Jul. 1981 113 p refs
(Contract DE-AC07-76ID-01570)
(DE81-029635; EGG-PHYS-5182) Avail: NTIS HC A06/MF A01

Integral capture reaction rates are reported for Nd 143, Nd 144, Nd 145, Sm 147, Ea 151, Eu 152, Eu 153 and Eu 154 irradiated in different neutron spectra in EBR. These reaction rates are based primarily on mass spectrometric measurements of the isotopic atom ratios of the capture product to the target nuclide. The neutron spectra are characterized using passive neutron dosimetry and spectrum unfolding with the FERRET least squares data analysis code. Reaction rates for the neutron spectrum monitors were determined by the radiometric technique using Ge(Li) spectrometers. The integral data for the rare earth samples and for the spectrum monitors were used in multi-group flux/cross sections adjustment analyses with FERRET to generate adjustments to 47 group representations of the ENDF/B-IV capture cross sections for the rare earth isotopes. DOE

N82-15971# Oak Ridge National Lab., Tenn. Solid State Div.

IN-SITU ELECTRON MICROSCOPE FRACTURE STUDIES OF AMORPHOUS FILMS

S. Kobayashi and S. M. Ohr 1981 9 p refs Presented at the 4th Intern. Conf. on Rapidly Quenched Metals, Sendai, Japan, 24 Aug. 1981
(Contract W-7405-eng-26)
(DE81-028141; CONF-810851-2) Avail: NTIS HC A02/MF A01

The in-situ electron microscope fracture technique is described. It was used to observe directly the propagation of cracks and the structure of the plastic zone ahead of the crack tip of amorphous films of niobium oxide. L.F.M.

N82-15972# California Univ., Berkeley. Lawrence Berkeley Lab.

PRODUCTION AND DESTRUCTION OF D(-) BY CHARGE TRANSFER IN METAL VAPORS

A. S. Schlachter Jun. 1981 27 p refs Presented at the Joint Workshop on Negative Ions, Mexico City, 1-4 Apr. 1981
(Contract W-7405-eng-48; Grant NATO-172.80)
(DE81-028134; LBL-12995; CONF-810442-4) Avail: NTIS HC A03/MF A01

Experimental studies of D(-) collisions are of interest for basic physics, where experimental results can be used to test theoretical models for charge transfer, and for applications to ion sources for accelerators and for heating magnetically confined plasmas of interest for fusion. The high D(-) yield from charge transfer in a thick cesium-vapor target is consistent with recent cross section calculations and measurments. Recent theoretical calculations of cross sections in thick alkaline earth vapor targets, leading to prediction of a large D(-) yield at low energy, have been partially confirmed in recent measurments, in which a D(-) yield of 50% was observed at a D energy of 500 eV. DOE

N82-15973# California Univ., Berkeley. Lawrence Berkeley Lab.

LOW TEMPERATURE DIFFUSION OF POSITIVE MUONS IN COPPER

C. W. Clawson, K. M. Crowe, S. E. Kohn, S. S. Rosenblum, C. Y. Huang, J. L. Smith, and J. H. Brewer 1981 10 p refs Presented at the 16th Intern. Conf. on Low Temperature Phys., Los Angeles, 19-25 Aug. 1981 Prepared in cooperation with LASL and British Columbia Univ.
(Contract W-7405-eng-36)
(DE81-030255; LA-UR-81-2473; CONF-810809-17) Avail: NTIS HC A02/MF A01

Measurement of the depolarization of positive muons in copper in zero external field shows that the hopping rate of the muons increases as the temperature decreases from 4.2 K to approximately 1K. An unambiguous demonstration of muon diffusion behavior which is not thermally activated. DOE

N82-15974# Oak Ridge National Lab., Tenn. Solid State Div.

ELECTRICAL PROPERTY STUDIES OF OXYGEN IN CZOCHRALSKI-GROWN NEUTRON-TRANSMUTATION-DOPED SILICON

J. W. Cleland and N. Fukuoka (Osaka Univ., Japan) Oct. 1980 30 p refs Presented at the 3rd Intern. Conf. on NTD-Silicon, Copenhagen, 27 Aug. 1980
(Contract W-7405-eng-26)
(DE81-028143; CONF-800877-3) Avail: NTIS HC A03/MF A01

Electrically active oxygen-related donors can be formed in Czochralski (Cz) Si either during crystal growth or during subsequent heat treatment. The carrier concentration of Cz and neutron transmutation doping (NTD) Cz Si samples was determined as a function of the initial dopant, oxygen, and P concentration before and after isothermal or isochronal annealing. Low temperature 350 C to 500 C heat treatment can introduce a significant oxygen donor concentration in Cz Si and in NTD Cz Si that contains radiation-induced lattice defects. Intermediate temperature (550 C to 750 C) heat treatment to remove oxygen donors or lattice defects, can introduce other oxygen donors. Extended (20 h) high-temperature 1000 C to 1200 C annealing can remove oxygen donors and lattice defects. Results suggest that oxygen-related donor formation in NTD Cz Si at temperatures below 750 C may serve to mask any annealing study of lattice defects. Annealing for 30 min at 750 C is sufficient to remove radiation damage in NTD Cz Si when the separate effects of oxygen donor formation are included. M.D.K.

N82-15975# Sandia Labs., Albuquerque, N. Mex.

RECENT ADVANCES IN THE STUDY OF STRUCTURAL PHASE TRANSISTORS AT HIGH PRESSURE

G. A. Samara 1981 8 p refs Presented at the Conf. on High Pressure Phys., Bad Honnef, W. Germany, Aug. 1981
(Contract DE-AC04-76DP-00789)
(DE81-030206; SAND-81-1151C; CONF-810828-6) Avail: NTIS HC A02/MF A01

The role of pressure in the study and understanding of some structural phase transitions in solids is discussed. Results on a number of crystals exhibiting displative, order-disorder and cooperative Jahn-Teler transitions are presented. The occurrence of each type of these transitions is determined by a balance between competing interactions, and pressure alters this balance and allows tests of our understanding of the physical phenomena involved. Some emphasis is on displacive transitions especially with regard to incommensurate structures and the behavior near the so called displacive limit. This limit is the special case where the transition temperature T/sub c/ = 0 K. As T/sub C/ decreases and approaches 0 K quantum effects can be expected to come into play. Pressure turns out to be an excellent variable to study the crossover from classical to quantum behavior expected on approaching the displacive limit. DOE

N82-15976# Brookhaven National Lab., Upton, N. Y.

SLOW POSITRONS IN THE STUDY OF SURFACE AND

NEAR-SURFACE DEFECTS
K. G. Lynn 1981 54 p refs Presented at the Intern. School of Phys. Position in Solids Conf., Lake Como, Italy, 14 Jul. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030027; BNL-29798; CONF-810756-1) Avail: NTIS HC A04/MF A01

A general theoretical model is presented which includes the probability of a positron diffusing back to the surface after implantation, and thermalization in samples containing various defects. This model incorporates surface state and thermal desorption from this state, as well as reflection back into the bulk. With this model vacancy formation enthalpies, activation energies of positrons from surface states, and specific trapping rates are deduced from the positronium fraction data. An amorphous Al/sub x/O/sub y/ overlayer on Al is discussed as an example of trapping in overlayers. In well-annealed single crystal samples, the positron is shown to be freely diffusing at low temperatures, whereas in a neutron-irradiatied Al single crystal sample the positron is localized at low positron binding energy defects presumably created during irradiation. DOE

N82-15977# Brookhaven National Lab., Upton, N. Y.
PHASE TRANSITIONS AND VARIANT ACTIONS IN LATTICE GAUGE THEORY
Michael Creutz Jun. 1981 12 p refs Presented at the Workshop on Nonperturbative Studies in Quantum Chromodyn., Providence, 19-20 Jun. 1981
(Contract DE-AC02-76CH-00016)
(DE81-029324; BNL-29823; CONF-8106146-1) Avail: NTIS HC A02/MF A01

Unexpected phase structure in four dimensional lattice gauge theory based on the groups SO(3) and SU(5) have prompted studies of variations on the Wilson action for SU(2). A rich phase structure related to the decomposition of SU(2) into SO(3) and Z2 is found. The scale of asymptotic freedom has a dramatic dependence on the choice of lattice action. DOE

N82-15978# Brookhaven National Lab., Upton, N. Y.
NEUTRON SCATTERING STUDIES OF QUASI ONE- AND TWO-DIMENSIONAL HYDROGEN-BONDED FERROELECTRICS
R. W. Youngblood 1981 9 p refs Presented at the 5th Intern. Meeting on Ferroelec., University Park, Penn., 17 Aug. 1981
(Contract DE-AC02-76CH-00016)
(DE81-030334; BNL-30004; CONF-810863-2) Avail: NTIS HC A02/MF A01

Neutron scattering studies of cooperative ordering in the hydrogen bond networks of stannous chloride dihydrate, copper formate tetrahydrate, and cesium dihydrogen phosphate are reviewed. In each case, there is an interesting nontrivial comparison to be made with an exactly solvable lattice model. DOE

N82-15979# Technische Universitaet, Brunswick (West Germany). Inst. fuer Geophysik und Meteorologie.
ANALYTICAL AND NUMERICAL MODEL EXPERIMENTS CONCERNING THE PHYSICS OF ROCK SALT FORMATION Ph.D Thesis - Carolo-Wilhelmina Tech. Univ., [ANALYTISCHE UND NUMERISCHE MODELLEXPERIMENTE ZUR PHYSIK DER SALZSTOCKBILDING]
Wolf-Dieter Woidt 1980 157 p refs In GERMAN
(Gamma-38) Avail: NTIS HC A08/MF A01

With the solution of the Rayleigh-Taylor instability for a multilayer case with arbitrary initial perturbation, a model was developed for the calculation of the plume phase of a natural salt structure (Northern Schleswig-Holstein, FRG). The geophysical parameters of this model were reconstructed, using geological findings and measurements. In order to calculate the dynamics of the diapiric phase, a simple two-layer model for arbitrary material boundary forms was numerically solved, using the finite element method. Good predictions of growth shape result. Author (ESA)

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

N82-15980# Oak Ridge National Lab., Tenn.
CONTINUUM CAPTURE IN THE THREE-BODY PROBLEM
Ivan A. Sellin 1980 34 p refs Presented at the 7th Intern. Conf. on Atomic Phys., Cambridge, Mass., 4 Aug. 1980 Prepared jointly with Tennessee Univ., Knoxville
(Contract W-7405-eng-26)
(DE81-025467; CONF-8008120-1) Avail: NTIS HC A03/MF A01

The three body problem, especially the problem of electron capture to the continuum in heavy particle collisions is reviewed. Major topics covered include: second Born induced asymmetry in electron capture to the continuum; historical context, links to other tests of atomic scattering theory; experiments characterizing the velocity distribution of electronic components code electrons; other atomic physics tests of high velocity Born expansions, atom capture; capture by positrons; and pion capture to the continuum. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N82-15981# California Univ., Berkeley. Lawrence Berkeley Lab. Engineering and Technical Services Div.
GRAD: A TOOL FOR PROGRAM ANALYSIS AND PROGRESS MONITORING
Winifred W. S. Yen and J. Dennis Lawrence Jun. 1981 5 p refs Presented at the Ann. Meeting of the Geothermal Resources Council, Houston, Tex., 25-29 Oct. 1981
(Contract W-7405-eng-48)
(DE81-028098; LBL-12820; CONF-811015-14) Avail: NTIS HC A02/MF A01

The development and operation of the Geothermal Resource Areas Database (GRAD) is described. The data base was created as part of the National Geothermal Progress Monitor System in 1979. The data base is organized around the concept of a geothermal area and provides broad coverage of geothermal development activities in the United States. Sixteen records, covering pre-lease, lease, and post-lease activities are defined for each area. Data collected in the various subject areas are critically evaluated, and then entered into an on-line interactive computer system. The system is publicly available for retrieval and use. DOE

N82-15982# Oak Ridge National Lab., Tenn.
ROLE OF ENGINEERING JUDGEMENT AND THE COMPUTER IN THE MANAGEMENT OF MATERIAL PROPERTY DATA
M. K. Booker 1980 5 p Presented at the ASMB Century 2 Emerging Technol. Conf., San Francisco, 13-14 Aug. 1980
(Contract W-7405-eng-26)
(DE81-028630; CONF-800804-43) Avail: NTIS HC A02/MF A01

The considerations involved in development of a successful computer based data system include: (1) several specialized systems are preferred to a single all encompassing system; (2) the system should be directed by materials experts, but should utilize computer experts; (3) all aspects of the system should emphasize flexibility; (4) an on line master file should be maintained with off line backup files; (5) characterization of data should take precedence over volume of data; (6) accuracy of input data should take precedence even over characterization, an interactive, on line textural numerical search and retrieval program is needed; and (7) the system should be a dynamic data management tool, not a passive repository for data flexible capabilities for analysis and display of data are essential. DOE

N82-15983# General Accounting Office, Washington, D. C. Procurement, Logistics, and Readiness Div.
FEDERAL RECORDS MANAGEMENT: A HISTORY OF NEGLECT
24 Feb. 1981 47 p refs
(PB81-237133; PLRD-81-2) Avail: NTIS HC A03/MF A01 CSCL 05A

Progress overcoming records management problems under the new legislation, the paperwork reduction act, was assessed. Serious deficiencies with records management have existed for years among Federal Government agencies. The National Archives and Records Service improving management oversight, and the Paperwork Reduction Act was enacted in 1980. The act imposes broad policy setting and oversight responsibilities on the Office of Management and Budget and requires reports to the Congress on agency information management activities.GRA

N82-15984# Dayton Univ., Ohio. Research Inst.
THE INFLUENCE OF AERONAUTICAL R&D EXPENDITURES UPON THE PRODUCTIVITY OF AIR TRANSPORTATION Final Report, 1926-1976
Ralph C. Lenz, John A. Machnic, and Anthony W. Elkins Jul. 1981 248 p refs
(Grant NSF SRS-79-10397)
(PB81-247140; UDR-TR-81-72; NSF/SIU-81-1) Avail: NTIS HC A11/MF A01 CSCL 05A

The impact which aeronautical R&D expenditures have had upon productivity growth in the air transportation industry over the 50-year period from 1926 to 1976 is examined. Quantitative analyses of the returns on U.S. investments in aeronautical R&D show that the net gains from such investments are very large in comparison with standard commercial opportunities during the same period. The gains were distributed primarily to the traveling public and, to a lesser extent, to the airline employees. Author

N82-15731*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MANAGEMENT, PLANNING, AND IMPLEMENTATION OF MEDICAL OPERATIONS
Norman Belasco *In its* STS-1 Med. Rept. Dec. 1981 p 99-110 (For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 05A

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N82-15985* National Aeronautics and Space Administration, Washington, D. C.
INDEX TO NASA NEWS RELEASES AND SPEECHES, 1980
1981 131 p
Avail: NTIS HC A07/MF A01 CSCL 05B

A listing is provided of 201 news releases distributed by the Office of Public Affairs, NASA Headquarters and 10 selected speeches presented by Headquarters staff in 1980. Subject and name indexes are arranged alphabetically. Indexes to titles, news release numbers and accession numbers are arranged numerically. A.R.H.

N82-15986*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TECHNICAL COMMUNICATION. PERSPECTIVES FOR THE EIGHTIES, PART 2
J. C. Mathes, comp. (Michigan Univ., Ann Arbor) and Thomas E. Pinelli, comp. Dec. 1981 316 p refs Papers presented at the 32nd Ann. Meeting of the Conf. on Coll. Composition and Commun., Dallas, 26-28 Mar. 1981 2 Vol.
(NASA-CP-2203-Pt-2; L-14899) Avail: NTIS HC A14/MF A01 CSCL 05B

The importance of technical writing as a separate discipline is suggested. Some specific areas addressed were: technical writing skills industry needs, definitions of technical writing, the hows and whys of inhouse writing, and the nature of the composing process in technical comunication. For individual titles, see N82-15987 through N82-15998.

N82-15987*# McDonnell-Douglas Corp., St. Louis, Mo.
SOME TECHNICAL WRITING SKILLS INDUSTRY NEEDS
F. R. Smith *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 335-341 (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

It is suggested that engineers and other technical students be taught three classes of skills in technical writing. First, 'Big Picture Things', which includes: the importance of clear writing, the wide scope of writing, the wide scope of writing tasks that will be faced in industry, and the principles of organization of technical materials such as; how to analyze, classify, partition, and interpret. Second, 'Writing Procedures', which encompasses: how to get words on paper efficiently and team-write. Third, 'Writing Details', in which two considerations are important: how to achieve precision in the use of language and the aspects of style. Three problems in style are cited: the problem of sentence transition, overuse of attributive adjectives, and verbosity in paragraph structure. The most important thing in technical writing is considered to be functionality, economy and clarity. M.D.K.

N82-15988*# Communication Support Services, Inc., Bedford, Tex.
TECHNICAL WRITING VERSUS TECHNICAL WRITING
J. W. Dillingham *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 343-348 refs (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

Two terms, two job categories, 'technical writer' and 'technical author' are discussed in terms of industrial and business requirements and standards. A distinction between 'technical writing' and technical 'writing' is made. The term 'technical editor' is also considered. Problems inherent in the design of programs to prepare and train students for these jobs are discussed. A closer alliance between industry and academia is suggested as a means of preparing students with competent technical communication skills (especially writing and editing skills) and good technical skills. M.D.K.

N82-15989*# Ethyl Corp., Detroit, Mich.
WHYS AND HOWS OF IN-HOUSE WRITING
John C. Lane *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 349-354 (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

The combining of requisite technical knowledge with requisite writing ability is addressed. Considerations in the development of in-house writing courses, in-plant training, are presented and evaluated. Specific problems in past methodology are also detailed. It is suggested that teachers of technical writing should be technical people themselves, preferably with working experience in industry or business; the training provided should be user-oriented, not theory oriented. M.D.K.

N82-15990*# Ohio State Univ., Wooster. Agricultural Technical Inst.
TECHNICAL WRITING PRACTICALLY UNIFIED THROUGH INDUSTRY

Linda S. Houston *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 369-383 refs (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

General background details in the development of a university level technical writing program, based upon the writing tasks of the student's occupations, are summarized. Objectives and methods for unifying the courses of study with the needs of industry are discussed. Four academic course divisions, Industries Technologies, in which preparation and training are offered are: Animal, Horticulture, Agriculture, and Agricultural Business. Occupational competence is cited as the main goal for these programs in which technical writing is to be practically unified through industry. Course descriptions are also provided. M.D.K.

N82-15991*# New Mexico State Univ., Las Cruces. Dept. of English.
THE COMPOSING PROCESS IN TECHNICAL COMMUNICATION
Roger E. Masse *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 387-399 refs (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

The theory and application of the composing process in technical communications is addressed. The composing process of engineers, some implications for composing research for the teaching and research of technical communication, and an interpretation of the processes as creative experience are also discussed. Two areas of technical communications summarized concern: the rhetorical features of technical communications, and the theoretical background for a process-based view, a problem-solving approach to technical writing. M.D.K.

N82-15992*# Rensselaer Polytechnic Inst., Troy, N. Y. Dept. of Language, Literature, and Communication.
A CASE STUDY OF THE INFLUENCES OF AUDIENCE AND PURPOSE ON THE COMPOSING PROCESSES OF AN ENGINEER
Bonny J. Stalnaker *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 401-411 refs (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

The design and preliminary findings of a study of composing processes (on the job) of engineers, managers, and scientists is presented. The influences of audience and purpose on the composing process of engineers was of concern; specifically, the cognitive processes, physical behaviors, and factors that influence the evoluton of a piece of writing. An overview of the study, related literature, outlines of research design, and preliminary findings from a case study of engineers are given. It is suggested that teaching be adapted to help students learn to represent rhetorical problems to guide composing for effective writing. M.D.K.

N82-15993*# University of Southern Illinois at Carbondale.
THE COMPOSING PROCESS IN TECHNICAL COMMUNICATIONS
Vivienne Lucas Hertz *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 423-433 refs (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

The theoretical construct under which technical writing exercises operate and results from a survey distributed to a random sample of teachers of technical writing are described. The survey, part of a study to develop materials that did not stress prescriptive formats, drew on diverse elements in report writing to enhance writing as a process. Areas of agreement and disagreement related to problem solving, paper evaluation, and individualizing instruction were surveyed. Areas of concern in contemplating the composition process include: (1) the need to create an environment that helps students want to succeed, (2) the role of peer group activity in helping some students who might not respond through lecture or individual study, and (3) encouraging growth in abilities and helping motivate students' interest in writing projects through relevant assignments or simulations students perceive as relevant. N.W.

N82-15994*# Iowa State Univ. of Science and Technology, Ames.
USING SENTENCE COMBINING IN TECHNICAL WRITING CLASSES
M. Rosner and T. Paul *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 527-534 refs (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

Sentence combining exercises are advanced as a way to teach technical writing style without reliance upon abstractions, from which students do not learn. Such exercises: (1) give students regular writing practice; (2) teach the logic of sentence structure, sentence editing, and punctuation; (3) paragraph development and organization; and (4) rhetorical stance. Typical sentence, paragraph, and discourse level sentence combining exercises are described. N.W.

N82-15995*# Rensselaer Polytechnic Inst., Troy, N. Y.
TEACHING AUDIENCE ANALYSIS TO THE TECHNICAL STUDENT
M. B. Debs and L. V. Brillhart (Triton Coll., River Grove, Ill.) *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 537-542 refs (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

Teaching audience analysis, as practiced in a technical writing course for engineering students, is discussed. Audience analysis is described as the task of defining the audience for a particular piece of writing and determining those characteristics of the audience which constrain the writer and effect reception of the message. A mature technical writing style that shows the tension produced when a text is written to be read and understood is considered in terms of audience analysis. Techniques include: (1) conveying to students the concept that a reader with certain expectations exist, (2) team teaching to preserve the context of a given technical discipline, and (3) assigning a technical report that addresses a variety of readers, thus establishing the complexity of audience oriented writing. N.W.

N82-15996*# Oklahoma Univ., Norman.
THE COMPOSING PROCESS OF TECHNICAL WRITERS: A PRELIMINARY STUDY
David Mair and Nancy Roundy (Iowa State Univ. of Science and Technology) *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 543-549 (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

The assumption that technical writers compose as do other writers is tested. The literature on the composing process, not limited to the pure or applied sciences, was reviewed, yielding three areas of general agreement. The composing process (1) consists of several stages, (2) is reflexive, and (3) may be mastered by means of strategies. Data on the ways technical writers compose were collected, and findings were related to the three areas of agreement. Questionnaires and interviews surveying 70 writers were used. The disciplines represented by these writers included civil, chemical, agricultural, geological, mechanical, electrical, and petroleum engineering, chemistry, hydrology, geology, and biology. Those providing consulting services, or performing research. No technical editors or professional writers were surveyed, only technicians, engineers, and researchers whose jobs involved composing reports. Three pedagogical implications are included. N.W.

N82-15997*# Minnesota Univ., St. Paul. Dept. of Rhetoric.
ANALOGICAL ACTS AS CONCEPTUAL STRATEGIES IN SCIENCE, ENGINEERING AND THE HUMANITIES
Victoria M. Winkler *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 559-568 refs (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

The composing models which operate by means of analogy are identified. The importance of analogical acts in the prewriting stage of the composing process is discussed. The relations between analogical acts and concept formation are explored. A basic correspondence between the analogical thinking employed in successful learning and analogical thinking as a composing strategy is discussed. Teaching analogical acts as conceptual strategies

for exploring problems and generating the form and content of discourse is presented in support of the contention that writing is a unique mode of learning. N.W.

N82-15998*# Rice Univ., Houston, Tex.
TRENDS IN LIABILITY AFFECTING TECHNICAL WRITERS
L. P. Driskill *In* NASA. Langley Research Center Tech. Commun., Pt. 2 Dec. 1981 p 597-608 refs (For primary document see N82-15986 06-82)
Avail: NTIS HC A14/MF A01 CSCL 05B

Liability of technical writers for defective products is explored. Documents generated during a product's life cycle (including design memos, design tests, clinical trials, trial use reports, letters, and proposals) become relevant because they are likely to become the only available means of showing that the product was not defectively designed. These documents become the evidence that the product underwent balanced and well considered planning, development, testing, quality control, and field testing. The predicted increased involvement of technical writers in the prevention and defense of product liability claims is cited in view of a greater number of cases turning on 'failure to warn'. N.W.

N82-15999# Defense Technical Information Center, Alexandria, Va. Office of Information Systems and Technology.
ANALYSIS OF RESPONSES TO SURVEY OF DTIC'S MILITARY USERS ON CURRENT AND PLANNED TECHNICAL LIBRARY/INFORMATION CENTER AUTOMATION
Final Report
Mary Belle Bonnett Oct. 1981 29 p refs
(AD-A105507) Avail: NTIS HC A03/MF A01 CSCL 05/2

This survey was undertaken to determine current use of automated functions in DTIC User Technical Libraries; areas where new services and support were desired from DTIC, and what automation efforts were planned and budgeted. Forty-seven percent of the responses indicate some automated functions in the library concerned, ranging from access to DROLS or commercial services by terminal to totally automated, integrated systems. Responses to the question requesting identification of additional or expanded services from DTIC, 123 requests were indicated. They include: remote site bibliographic files, 18; electronic mail service, 15; consultation and advice, 39; automated library model, 11; dial-up access to DROLS, 12; and other services, 28. A total of 195 specific automation projects were identified as in the plans of respondents. Author (GRA)

N82-16000# Center for Policy Research, Inc., Bethesda, Md.
A WORKSHOP ON QUALITATIVE INFORMATION RETRIEVAL
Stephen B. Weiner 28 Sep. 1981 66 p refs Workshop held on 18-20 Nov. 1980
(Contract N00014-80-C-0105; Grant NSF IST-80-18904; NR Proj. 049-473)
(AD-A105897) Avail: NTIS HC A04/MF A01 CSCL 05/2

Work in the Office of Administration of the Carter White House on the development of a non-intermediated information retrieval system led to consideration of the problem of information retrieval when controlled vocabulary fails. Discussion of that problem led to the development of a typology of such failures and to an examination of methods of resolving the problems. While a detailed discussion of the typology and the methods of resolution is not appropriate at this point, that typology was presented as the point of departure for deliberation by the Workshop on Qualitative Information Retrieval, the results of which this report summarizes. It is, therefore, appropriate to review briefly that typology. GRA

N82-16001# California Univ., Livermore. Lawrence Livermore Lab.
COST/BENEFIT ANALYSIS OF IMPLEMENTING LWG FORTRAN COMPILER/LIBRARY SYSTEMS
Terry Heidelberg 6 Jul. 1981 45 p refs
(Contract W-7405-eng-48)
(DE81-028252; UCID-30185) Avail: NTIS HC A03/MF A01

A cost benefit analysis for implementing Language Workshop group (LWG) FORTRAN through a rehostable compiler/library system is described. Increases in programmer productivity resulting from implementation of LWG FORTRAN are concluded. Four cost factors are included: implementation and centralized maintenance; program conversion costs at each LWG laboratory, programmer training costs, and local compiler maintenance. Two benefit factors, programming productivity and sharing of programs are also included. DOE

N82-16002# Battelle Pacific Northwest Labs., Richland, Wash.
DATA EDITING ON LARGE DATA SETS
James J. Thomas, Robert A. Burnett, and Janice R. Lewis 1981 11 p refs Presented at the 13th Symp. on the Computer Sci. and Statistics Interface, Pittsburgh, 12 Mar. 1981
(Contract DE-AC06-76RL-01830)
(DE81-028022; PNL-SA-9219; CONF-810342-2) Avail: NTIS HC A02/MF A01

A data editor, implemented as a single computational tool combining facilities from data management systems, text editors, graphics packages, and statistics packages with emphasis on research data base manipulation and subsetting techniques is described. The data editor provides an interactive environment to explore and manipulate in particular large data sets. It utilizes a relational data transportability to other data analysis packages. Editing large data sets is discussed. A technique for manipulating portions or subsets of large data sets without physical replication is introduced. An experimental command structure and operating environment are presented. DOE

N82-16003# Battelle Pacific Northwest Labs., Richland, Wash.
SUMMARY OF THE GRAPHIC INFORMATION DISPLAY SESSION
D. B. Carr Mar. 1981 5 p Presented at the DOE Statistics Symp., Berkeley, Calif., 27 Oct. 1981
(Contract DE-AC06-76RL-01830)
(DE81-028231; PNL-SA-9370; CONF-811031-1) Avail: NTIS HC A02/MF A01

Examples, principles, and ideas concerning color graphics data displays and n-dimensional pattern recognition in environmental systems are summarized. Access to graphics tools is sketched. Uses of color and exploratory data analysis is considered. State maps and scatter plots are compared. Problems in displaying multidimensional data were addressed. Computer generated movies, useful in displaying a third dimension by motion, and time dependent data, are mentioned. DOE

N82-16004# Battelle Pacific Northwest Labs., Richland, Wash.
SELF-DESCRIBING DATA FILE STRUCTURE FOR LARGE DATA SETS
Robert A. Burnett 1981 7 p refs Presented at the 13th Symp. on the Computer Sci. and Statistics Interface, Pittsburgh, 12 Mar. 1981
(Contract DE-AC06-76RL-01830)
(DE81-027997; PNL-SA-9179; CONF-810342-3) Avail: NTIS HC A02/MF A01

A self-describing binary (SDB) data file structure was designed and implemented together with a set of basic data manipulation functions and supporting SDB data access routines. Logical and physical data descriptors are stored in SDB files preceding the data values. SDB files thus provide a common data representation for interfacing diverse software components. The various types of data descriptors and data structures permitted by the file design are described. Data buffering, file segmentation, and a segment overflow handler are also discussed. DOE

N82-16005# Oak Ridge National Lab., Tenn.
PRELIMINARY INTERNAL DATA SCREENING: A COMPONENT OF QUANTITATIVE DATA ANALYSIS IN DATA VALIDATION
David J. Pack 1981 31 p refs Presented at the Am. Statist. Assoc. Meeting, Detroit, 10 Aug. 1981
(Contract W-7405-eng-26)
(CONF-810842-1) Avail: NTIS HC A03/MF A01

Two objectives of preliminary internal data screening are examined. The first, producing a frozen, archived database ready for efficient computer analysis, is defined. It is seen to be achievable through simple computer methodology. The second objective produces a general understanding of key variables, a rough cut at response meaningfulness, a qualification of the type of group present, and an assessment of the expected level of difficulty in comprehensive validation. Initial methodological

suggestions for accomplishing the second objective are made. Appropriateness of its techniques for a general examination of a large database that may contain numerous errors is recognized. N.W.

N82-16006# Department of Energy, Washington, D. C.
MANAGING LARGE-SCALE MODELS: DBS
May 1981 319 p refs
(DE81-028683; DOE/EP-0006) Avail: NTIS HC A14/MF A01

A set of fundamental management tools for developing and operating a large scale model and data base system is presented. A broad range of generic management problems are classified into three groups: documentation, operations, and maintenance. System problems are identified, the solutions for gaining management control are discussed. Practical methods for dealing with these problems are presented. DOE

N82-16007# California Univ., Livermore. Lawrence Livermore Lab.
CONCERNING TECHNICAL MEANS FOR DEALING WITH ASPECTS OF THE NEAR-TERM INFORMATION ONSLAUGHT
Lowell Wood 1981 19 p Presented at the Conf. on Sci. and the Inform. Onslaught, Los Alamos, N. Mex., 1-5 Jun. 1981
(Contract W-7405-eng-48)
(DE81-030159; UCRL-86581; CONF-8106155-1) Avail: NTIS HC A02/MF A01

Predictions are given about the future capabilities of the electronics manufacturing industry to produce very-large-scale integrated circuit computers. Such computers would have three to six orders of magnitude more computing power than present systems. The implications of this increase are considered even in terms of implanted intelligence in humans. DOE

N82-15730*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
MEDICAL INFORMATION MANAGEMENT
Edward C. Moseley *In its* STS-1 Med. Rept. Dec. 1981 p 93-98
(For primary document see N82-15711 06-51)
Avail: NTIS HC A06/MF A01 CSCL 05B

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

N82-16008*# Helicopter Association of America, Washington, D. C.
COMMUNITY ROTORCRAFT AIR TRANSPORTATION BENEFITS AND OPPORTUNITIES Final Report, Dec. 1981
Glen A. Gilbert, Darral J. Freund, Robert M. Winick, Nicholas J. Cafarelli, Richard F. Hodgkins, Tirey K. Vickers et al Dec. 1981 181 p refs
(Contract NAS2-10798)
(NASA-CR-166266) Avail: NTIS HC A09/MF A01 CSCL 01C

Information about rotorcraft that will assist community planners in assessing and planning for the use of rotorcraft transportation in their communities is provided. Information useful to helicopter researchers, manufacturers, and operators concerning helicopter opportunities and benefits is also given. Three primary topics are discussed: the current status and future projections of rotorcraft technology, and the comparison of that technology with other transportation vehicles; the community benefits of promising rotorcraft transportation opportunities; and the integration and interfacing considerations between rotorcraft and other transportation vehicles. Helicopter applications in a number of business and public service fields are examined in various geographical settings. R.J.F.

N82-16009*# National Aeronautics and Space Administration, Washington, D. C.
NASA: TECHNOLOGY TRANSFER
1982 14 p
(NASA-TM-84070) Avail: NTIS HC A02/MF A01 CSCL 05A

NASA's technology transfer program, a multifaceted effort designed to facilitate the use of aerospace technology in public and private sector application, is described The effort embraces two major areas: (1) facilitating broader application of remote sensing technology and (2) fostering technology utilization, or encouraging reuse of technology emerging from NASA's mainline programs. N.W.

N82-16010# California Univ., Livermore. Lawrence Livermore Lab. Transportation Systems Research Dept.
DEVELOPMENT OF THE ALUMINUM-AIR BATTERY FOR ELECTRIC VEHICLE APPLICATIONS
John F. Cooper and Robert V. Homsy 12 Aug. 1981 11 p refs Presented at the 4th Intern. EVDG Conf. and Demonstration, London, 15-16 Sep. 1981
(Contract W-7405-eng-48)
(DE81-028446; UCRL-86560; CONF-810938-1) Avail: NTIS HC A02/MF A01

The development of hardware for the aluminum-air electric vehicle battery is discussed. The polarization curves of large-scale aluminum-air cells (0.1 sq m anodes) were replicated in rapidly-refuelable cells of subscale size (167-sq cm) which were constructed for stacking into multicell modules. Solution-side current collection by a structure which makes point or line contacts at the aluminum/electrolyte interface is described. The technique allows rapid anode addition, minimizes anode fabrication costs, and simplifies cell design. The possible application of solution-side current collection to wedge-shaped cells allowing continuous anode feed and full utilization is discussed. Life-cycle testing of air electrodes in candidate battery electrolytes is reported. Temperature and aluminate concentration transients are modeled using experimental rate data. Program structure, technical strategy, goals, and economic analysis are briefly discussed. DOE

N82-16011# New Zealand Energy Research and Development Committee, Auckland.
FEASIBILITY OF ELECTRIC VEHICLES IN NEW ZEALAND Final Report
J. P. Noble (Leyland Watson and Noble), J. West (Liquid Fuels Trust Board), J. B. Randle (New Zealand Electricity Div.), P. D. Ritchie (Ministry of Works and Development), and J. Owen (Barr Browns Ltd.) 1981 45 p refs Sponsored in part by Liquid Fuels Trust Board
(DE81-903684; NZERDC-61-Vol-1; ISSN-0110-1692; ISSN-0110-1191) Avail: NTIS HC A03/MF A01

A state of the art review of current electric vehicle technology in New Zealand and overseas is provided. The role of electric

vehicles in New Zealand, with regard to local vehicle use patterns and the availability of alternative transport fuels, is determined. An economic assessment of electric vehicle applications in comparison to other vehicles is prepared. The national benefit of electric vehicle utilization is assessed. Further research, development, and demonstration requirements to define the potential of, and implementation strategies for electric vehicle use in New Zealand are identified. Results are presented and discussed. DOE

N82-16012# Applied Decision Analysis, Inc., Menlo Park, Calif.
EVALUATING R AND D OPTIONS UNDER UNCERTAINTY. VOLUME 2: ATMOSPHERIC FLUIDIZED-BED COMBUSTION COMMERCIALIZATION STRATEGIES Final Report
A. B. Borison, B. R. Judd, P. A. Morris, and E. C. Walters Aug. 1981 79 p Sponsored by Electric Power Research Inst.
(EPRI Proj. 1432-1)
(DE81-904246; EPRI-EA-1964-Vol-2) Avail: NTIS HC A05/MF A01

A quantitative framework for analyzing commercialization decisions for emerging electrical power generation technologies was developed. The framework addresses the general question of when to freeze a design for commercialization. The framework was developed to help evaluate the benefits of continuing the development of two different designs for atmospheric fluidized bed combustion boilers. EPRI staff participated actively in specifying the scope of the anaiysis and in providing technical information on the two designs. The framework was demonstrated using this information, supplemented with probablistic judgments by EPRI staff about possible outcomes from the pilot and demonstration stages of development. Based on the technical data and judgments supplied by EPRI staff, the analysis shows a net benefit for proceeding with the development of two designs. DOE

N82-16013# Applied Decision Analysis, Inc., Menlo Park, Calif.
EVALUATING R AND D OPTIONS UNDER UNCERTAINTY. VOLUME 3: AN ELECTRIC-UTILITY GENERATION-EXPANSION PLANNING MODEL Final Report
A. B. Borison, B. R. Judd, P. A. Morris, and E. C. Walters Aug. 1981 114 p refs Sponsored by Electric Power Research Inst.
(EPRI Proj. 1432-1)
(DE81-904237; EPRI-EA-1964-Vol-3) Avail: NTIS HC A06/MF A01

An electric utility generation expansion model developed for use in research and development (R and D) planning under uncertainty is described. The model provides a framework for examining broad utility and R and D planning issues, rather than the specific generation expansion decisions of individual utilities. Unlike existing approaches, the model focuses directly on the demand, technological, and regulatory uncertainties and the long term dynamics that affect the impact of R and D achievements. The model's somewhat aggregate approach to electric utility decision making (to allow repeated application at low cost) can be modified, as needed, for more detailed utility planning. When fully implemented, the model can be applied to the analysis of issues such as technology adoption, reserve margin, unit size, reliability, storage and load management effects, lead time, and government regulation. DOE

N82-16014# Brookhaven National Lab., Upton, N. Y.
APPLICATION OF AN LP MODEL TO STRATEGIC PLANNING OF MULTINATIONAL COOPERATIVE RD AND D PROGRAMS
V. L. Sailor 1981 10 p refs
(Contract DE-AC02-76CH-00016)
(DE81-029325; BNL-29857) Avail: NTIS HC A02/MF A01

An analytical study was initiated to serve as a basis for defining a cooperative strategy for RD and D among International Energy Agency member nations. A flexible energy system model, MARKAL, was developed as the primary tool for the analysis. The flexibility of MARKAL is demonstrated by the fact that the diverse energy systems of sixteen countries and the aggregated European Economic Community have been modeled successfully. MARKAL is a multi-period linear programming model which describes the energy flows, costs, and resource consumption of national energy systems over an extended period of time (1980 to 2020). Various policy options and assumptions about future world situations create a range of scenarios which control the MARKAL solutions. Such options and such postulated conditions, translated into operational indicators to drive the MARKAL model and constrain its solutions, are described. DOE

N82-16015# Netherlands Organization for Applied Scientific Research TNO, Delft.
RESEARCH IN URBAN PLANNING DURING THE 70'S [HET PLANOLOGISCH ONDERZOEK IN DE JAREN ZEVENTIG]
J. C. Daamen, M. V. Besselaar, H. C. Christerus, and C. W. W. vanLohuizen 1980 243 p refs In DUTCH
(TNO-80/PS/206) Avail: NTIS HC A11/MF A01

The extent, nature, and themes of urban planning research in the Netherlands are described. Projects were indexed for contribution to the promotion, coordination, and programming of research. The inventory contains public research projects and government research projects by order of the government. The different fields of research are only quantitatively (number of projects) assessed. Activities showing research trends in the first half of the decade are compared with those in the second half of the decade. Author (ESA)

N82-16016# Pintsch Oel Berlin G.m.b.H. (West Germany). Mineraloelraffinerie.
DEVELOPMENT OF AN Na DISTILLATION PROCESS FOR RE-REFINING WASTE OIL IN ORDER TO AVOID ENVIRONMENT POLLUTION. PHASE 1: PRELIMINARY TESTS IN BERN Final Report, Mar. 1979
Siegfried Draebert, Eberhard Rohner, Fritz Robert Ruhkopf, and Peter Schmitz Bonn Bundesministerium fuer Forschung und Technologie Feb. 1981 60 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-T-81-034; ISSN-0340-7608) Avail: NTIS HC A04/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 12.60

Test results show that compared to a sulfuric acid process, the sodium process: has a product yield 2 to 3% higher; product quality is better; environmental impact is lower; and is more economical. These tests show that the sodium process can also be used in practice. Author (ESA)

N82-16017# Transportation Research Board, Washington, D.C.
TRANSIT PLANNING AND MANAGEMENT
Walter Cherwony, Michael G. Ferreri, Louis J. Pignataro, William R. McShane, Anthony J. Wiener, Arnold J. Bloch, William H. Crowell, Genenieve Giuliano, Jerome M. Lutin, and Matthew Liotine 1981 89 p refs
(PB81-238032; TRB/TRR-797; ISBN-0-309-03211-32; LC-81-11205; ISSN-0361-1981) Avail: NTIS HC A05/MF A01; HC also avail: Transportation Research Board, 2101 Constitution Ave., N.W., Washington, D.C. CSCL 13B

Management and planning issues affecting primarily rail and bus mass transit are presented. Topics include strategic planning, future directions, environmental factors, modeling, demand analysis, employer subsidies, the Caracas subway, funding procedures, performance evaluation, operating expenditures, paraprivate transportation, logistics, pupil routing, and combined passenger and postal services. GRA

N82-16018# Alabama Univ., Birmingham. Dept. of Biology.
IMPROVING MUNICIPAL AND INDUSTRIAL WASTE TREATMENT PROCESSES: NUTRITIONAL AND PHYSICAL CONDITIONS THAT REGULATE FLOC FORMATION IN BACTERIA ISOLATED FROM ACTIVATED SLUDGE Project Completion Report, 1 Oct. 1979 - 30 Sep. 1980
Jospeh J. Gauthier 30 Jun. 1981 70 p refs
(Contract DI-14-34-0001-9101)
(PB81-246282; W81-05004; OWRT-A-068-ALA(1)) Avail: NTIS HC A04/MF A01 CSCL 06M

The mechanisms by which sludge microorganisms form floc were studied. In the activated sludge process, microorganisms are separated from the treated wastewater by settling in a clarifier. Sludge settling is dependent upon the ability of the microbes in the mixed liquor to adhere to one another. Several zoogloeal isolates, obtained from both municipal and industrial sludge, were

tested for floccing efficiency when they were grown to the logarithmic and stationary phase. GRA

N82-16019# Environmental Protection Agency, Ann Arbor, Mich. Test and Evaluation Branch.
EVALUATION OF A DRESSERATOR SYSTEM TEST VEHICLE
Thomas J. Penninga Jun. 1981 38 p
(PB81-245722; EPA-AA-TEB-81-21) Avail: NTIS HC A03/MF A01 CSCL 13B

A vehicle was tested to determine the feasibility of the Dresser Sonic Flow Carburetor system as applied to a 3-way catalyst system. The testing conducted included: the standard Federal Testing Procedure, Highway Fuel Economy Testing, testing at 20, 40, 60, and 70 degrees F and sulfate testing. The test vehicle achieved emission levels below the 1981 and subsequent model year standards of .41 gm/mile hydrocarbon, 3.4 gm/mile carbon monoxide and 1.0 gm/mile NOx. The vehicle suffered starting problems at lower temperatures but had no driveability problems when warmed up. An extended idle period at the beginning of the cold start test procedure was also used at lower temperature. This modified FTP procedure improved driveability and lowered vehicle emissions somewhat. GRA

N82-16020# California State Dept. of Transportation, Sacramento.
GEOLOGIC HAZARDS AND THEIR RELATION TO PLANNING, LOCATION, AND DESIGN OF TRANSPORTATION FACILITIES Final Report
James Gamble Jan. 1981 325 p refs Sponsored by the FHA
(PB81-235467; TL-954129; FHWA/CA-81/04) Avail: NTIS HC A14/MF A01 CSCL 13B

The geologic hazards frequently encountered are described, together with field methods for efficiently obtaining the information required for recognition and subsequent documentation of these hazards in a Geologic Hazard Report. The need for District planners to recognize possible geologic hazards on a proposed project at an early stage is emphasized. The principle purpose of a Geologic Hazard Report is to facilitate preparation of the environmental document required for project. Failure of environmental report writers to fully utilize this material results in negative comments by reviewers of the draft copy, thus resulting in delays in achieving an approval of a final draft of Environmental Impact Statements or Negative Declarations. GRA

N82-16021# Transportation Research Board, Washington, D.C.
HIGHWAY SAFETY APPURTENANCES
Jarvis D. Michie, C. E. Kimball, Jr., M. E. Bronstad, Don L. Ivey, Richard Robertson, and Naomi Kassabian, ed. 1981 59 p refs Sponsored by FHA
(PB81-236085; TRB/TRR-796; ISBN-0-309-03210-5) Avail: NTIS HC A04/MF A01 CSCL 13B

Collision risk assessment is addressed. Heavy vehicle tests of tubular thrie beam retrofit bridge railing are reported. Barriers for construction zones are considered. Safety improvement alternatives for utility poles are covered. The strength of fillet welds in aluminum lighting poles is examined. Traffic barrier crash tests are presented. A self restoring traffic barrier is explained. GRA

88 SPACE SCIENCES (GENERAL)

N82-16022*# National Aeronautics and Space Administration, Washington, D. C.
AERONAUTICS AND SPACE REPORT OF THE PRESIDENT, 1980 ACTIVITIES
1981 108 p
(NASA-TM-84079) Avail: NTIS HC A06/MF A01 CSCL 05A

The year's achievements in the areas of communication, Earth resources, environment, space sciences, transportation, and space energy are summarized and current and planned activities in these areas at the various departments and agencies of the Federal Government are summarized. Tables show U.S. and world spacecraft records, spacecraft launchings for 1980, and scientific payload and probes launched 1975-1980. Budget data are included. A.R.H.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N82-16023# Maryland Univ., College Park. Center for Archaeoastronomy.
ARCHAEOASTRONOMY IN THE AMERICAS
Ray A. Williamson, ed. Los Altos, Calif. Ballena Press 1981 407 p refs
(BP-AP-22; ISBN-0-087919-094-9) Avail: NTIS HC A18/MF A01

The state of the art of archaeoastronomy is discussed. Papers are presented which report findings in North America, Central America, South America, and Ireland. The role of archaeoastronomy in teaching is also discussed. S.L.

N82-16024# Max-Planck-Institut fuer Physik und Astrophysik, Garching (West Germany). Inst. fuer Extraterrestrische Physik.
CONSTRUCTION AND USE OF A STANDARD SOURCE FOR FAR INFRARED ASTRONOMY EXPERIMENTS [BAU UND EINSATZ EINER EICHQUELLE FUER FERNINFRAROT-ASTRONOMIE-EXPERIMENTE]
Winfried Jennert Feb. 1981 100 p refs In GERMAN
(MPI-PAE/Extraterr-165; ISSN-0340-8922) Avail: NTIS HC A05/MF A01

A flexible standard radiation source suited for far infrared astronomy experiments is analyzed. The source makes use of two black bodies built in a liquid nitrogen cooled dewar. One of them can be heated to a temperature between 80 and 400K, the other, the reference source, has the temperature of the nitrogen bath. The radiation flux is modulated by numerical control while the exit openings of the black bodies are imaged on the standard source outlet pupil, outside the dewar. The modulated radiation intensity can be adjusted and superposed on the constant reference intensity. A helium cooled Ge-Ga bolometer was calibrated and atmospheric absorption measurements were conducted.
Author (ESA)

N82-16025# Centre National de la Recherche Scientifique, Marseilles (France). Lab. d'Astronomie Spatiale.
THREE MIRROR ANASTIGMATIC (TMA) TELESCOPE FOR OBSERVATION OF FAINT OBJECTS IN THE ULTRAVIOLET (1200 TO 1800 A) APPLIED IN THE GLASAR EXPERIMENT [TELESCOPE ANASTIGMAT A TROIS MIROIRS (TMA) POUR L'OBSERVATION ASTRONOMIQUE DANS L'ULTRAVIOLET (1200-1800 A) APPLIQUE A L'EXPERIENCE GLASAR]
Michel Saisse 1981 37 p refs In FRENCH Presented at Reunion Franco-Sovietique, Moscow, 16-22 Mar. 1981
Avail: NTIS HC A03/MF A01

The GLASAR experiment which uses a reflecting telescope on board Salyut for astronomical spectrometry in the far UV is discussed. Physical constraints imposed on the instrument are mentioned. A three mirror system and aberrations of the third order for the TMA telescope are described. An optimization method for the third order approximation is presented. Utilizing an automatic aberration correction program, final optimization of the system by reduction of higher order aberrations is achieved.
Author (ESA)

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N82-16026*# California Univ., Berkeley. Space Sciences Lab.

ENERGETIC PARTICLES FLUX EXPERIMENT FOR ISEE MOTHER/DAUGHTER SPACECRAFT Final Report, 23 May 1974 - 31 Oct. 1979
K. A. Anderson Sep. 1981 96 p refs
(Contract NAS5-20079)
(NASA-CR-166761) Avail: NTIS HC A05/MF A01 CSCL 03B

The history of the energetic particle experiments on the International Sun Earth Explorer 1 and 2 spacecraft is outlined, and descriptions of the instruments are given. The inflight performance and data analysis are summarized. The research is completed and ongoing are described and a bibliography is included. Author

N82-16027# Los Alamos Scientific Lab., N. Mex.
SUPERNOVA HYDRODYNAMICS
Stirling A. Colgate 1981 8 p refs Presented at the Plasma Astrophys. Course and Workshop, Varenna, Italy, 27 Aug. - 7 Sep. 1981 Submitted for publication
(Contract W-7405-eng-36)
(DE81-030243; LA-UR-81-2575; CONF-810870-1) Avail: NTIS HC A02/MF A01

The phenomena of stellar explosions is interpreted, and the dynamical expansion of a star is described. The mechanism of explosion is studied in order to improve the ability to model the most extreme conditions of matter and hydrodynamics that occur presently and excessively in the universe. DOE

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N82-16028*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VIKING LANDER IMAGING INVESTIGATION DURING EXTENDED AND CONTINUATION AUTOMATIC MISSIONS. VOLUME 2: LANDER 2 PICTURE CATALOG OF EXPERIMENT DATA RECORD
Kenneth L. Jones, Mary Henshaw, Christe McMenomy, Andres Robles, Paul C. Scribner, Stephen D. Wall, and Jackson W. Wilson Apr. 1981 566 p refs 2 Vol.
(NASA-RP-1068-Vol-2; L-14054) Avail: NTIS HC A24/MF A01 CSCL 03B

Images returned by the two Viking landers during the extended and continuation automatic phases of the Viking Mission are presented. Information describing the conditions under which the images were acquired is included with skyline drawings showing the images positioned in the field of view of the cameras. Subsets of the images are listed in a variety of sequences to aid in locating images of interest. The format and organization of the digital magnetic tape storage of the images are described. A brief description of the mission and the camera system is also included. Author

N82-16029*# Arizona Univ., Tucson. Dept. of Planetary Sciences.
SPECTROSCOPIC OBSERVATIONS OF COMETS Final Report
[1982] 9 p refs
(Grant NAG5-86)
(NASA-CR-165077) Avail: NTIS HC A02/MF A01 CSCL 03B

Development of a spectrograph using a microchannel plate intensifier for observing faint comets is described. The spectrograph is capable of obtaining useful spectra of objects as faint as M(2) = 18. The increased guiding efficiency achieved by the optical coupling of the ISIT vidicon of the 154 cm telescope has resulted in a better signal to noise ratio. The ability to take a direct image of the comet aids in the interpretation of the spatial profile of the emissions. Spectra of comets Schwassmann-Wachmann 1, Bradfield, Encke, Tuttle, and Stephen-Oterma are discussed. J.D.H.

N82-16030*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
VOYAGER 1 ENCOUNTERS SATURN
Dec. 1980 40 p Original contains color illustrations
(NASA-TM-84078; JPL-400-100) Avail: NTIS MF A01; HC SOD CSCL 03B

The Voyager 1 encounter with Saturn is described. Color photographs of Saturn and its moons are included. Mission objectives and spacecraft characteristics are discussed. Emphasis is placed on Saturn's atmosphere, the rings, the magnetosphere, and the moons. R.J.F.

N82-16031*# Arizona Univ., Tucson.
COMETS: GASES, ICES, GRAINS AND PLASMA Final Report
Laurel L. Wilkening 1981 75 p refs Colloq. at Tucson, Arizona, 11-14 Mar. 1981; sponsored in part by International Astronomical Union, American Astronomical Society, Committee on Space Research, NSF and Arizona Univ.
(Contract NASw-3413)
(NASA-CR-165073; IAU-Colloquium-61) Avail: NTIS HC A04/MF A01 CSCL 03B

The program and abstracts of the 97 papers delivered at the colloquium are presented. Cometary nuclei, comet dust, the coma, ion tails, several comet missions, and cometary origin and evolution were discussed. J.D.H.

N82-16032# Max-Planck-Institut fuer Kernphysik, Heidelberg (West Germany). Lehrstuhl fuer Raumfahrttechnik.
INVESTIGATIONS OF MICROMETEROID IMPACTS IN LARGE AREAS AND LONG DURATION MISSIONS Final Report, Oct. 1980
Eduard Igenbergs (Technischen Univ., Munich) and Hugo Fechtig Bonn Bundesminesterium fuer Forschung und Technologie Aug. 1981 72 p refs In GERMAN; ENGLISH summary Sponsored by Bundesminesterium fuer Forschung und Technologie
(BMFT-FB-W-81-031; ISSN-0170-1339) Avail: NTIS HC A06/MF A01; Fachinformations-zentrum, Karlsruhe, West Germany DM 15,15

An assessment of the scientific benefit and the technical feasibility of micrometeoroid experiments in long duration missions with large exposure areas is described. The measurements and the theoretical models of the dust environment are described. A survey of future space missions was compiled average flow. With these data a proposal for a long duration experiment is discussed. Author

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N82-16033*# Xavier Univ. of Louisiana, New Orleans. Dept. of Physics/Pre-Engineering.
SOLAR RADIATION MEASUREMENT PROJECT Final Report
Juliette W. Ioup 31 Dec. 1981 53 p
(Grant NsG-8050)
(NASA-CR-165064) Avail: NTIS HC A04/MF A01 CSCL 03B

The Xavier solar radiation measurement project and station are described. Measurements of the total solar radiation on a horizontal surface from an Eppley pyranometer were collected into computer data files. Total radiation in watt hours was converted from ten minute intervals to hourly intervals. Graphs of this total radiation data are included. A computer program in Fortran was written to calculate the total extraterrestrial radiation on a horizontal surface for each day of the month. Educational and social benefits of the project are cited. R.J.F.

N82-16034# Max-Planck-Institut fuer Aeronomie, Katlenburg-Lindau (West Germany).
THE INSTRUMENTS OF THE PLASMA EXPERIMENT

ONBOARD THE HELIOS SOLAR PROBE Final Report
Helmut Rosenbauer, Rainer Schwenn, Hans Miggenrieder, Bernhard Meyer, Heiner Gruenwaldt, Karl-Heinz Muehlhaeuser, Heinz Pellkofer, and John H. Wolfe Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 228 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-015; ISSN-0170-1339) Avail: NTIS HC A11/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 39.10

The plasma experiment on board the solar probe HELIOS, consisting of four instruments designed to investigate the interplanetary plasma, or solar wind, is discussed. The velocity distribution functions of the different kinds of particles are measured. Hydrodynamic parameters of the solar wind plasma can then be derived. Three instruments analyze the positive component of the solar wind (protons and heavier ions with energy-per-charge values from 0.155 to 15.32 kV). Two of them permit an angular resolution in both directions of incidence. One instrument measures electrons in the energy range from 0.5 to 1660 eV with a one-dimensional angular resolution. Author

N82-16035# Messerschmitt-Boelkow-Blohm G.m.b.H., Ottobrunn (West Germany). Unternehmensbereich Raumfahrt.
GAMMA RAY DETECTOR FOR SOLAR MAXIMUM MISSION (SMM) OF NASA Final Report, Jul. 1980
Wolfgang Brunner, Karl Brichzin, and Ernst Sach Bonn Bundesministerium fuer Forschung und Technologie Jun. 1981 174 p refs Partly in GERMAN and ENGLISH Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-020; ISSN-0170-1339) Avail: NTIS HC A08/MF A01; Fachinformationzentrum, Karlsruhe, West Germany DM 33.90

For the SMM (launch 14.2.80) a gamma ray detector was developed, manufactured and tested to measure solar high energetic gamma rays and neutron fluxes within the energy range 10-160 MeV, 4.43 MeV and 2.23 MeV. The main components of the sensor are 7 NaI crystals 3" x 3" and a CsI crystal 30 cm x 7.5 cm. The rejection of charged particles is done by two plastic scintillators and 4 CsI shields. From the beginning of the mission the experiment is working fully successful. Author

N82-16036# Technische Hochschule, Darmstadt (West Germany). Angewandte Geophysik.
THE INTERACTIONS OF THE HELIOS PROBE WITH THE SOLAR WIND PLASMA Final Report, Mar. 1981
Gerd-Hannes Voigt, Ulrich Isensee, and Henning Haassberg Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 278 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-036; ISSN-0170-1339) Avail: NTIS HC A13/MF A01; Fachinformatins-zentrum, Karlsruhe, West Germany DM 44.30

A space charge cloud is formed around the HELIOS solar probe due to strong photoelectron emission and fade out of solar wind particles. The conducting and isolating parts of the surface are differently charged, resulting in a very complex potential structure in the vicinity of the probe and on the surface. The interactions of the HELIOS probe with the solar wind plasma are described by models based on kinetic theory of plasma. The combination of these models yields and entire and consistent representation of the spacecraft charging and the potential structure. Electron spectra measured by the plasma experiment are analysed and compared with results of the theoretical models. Author

N82-16037# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 441, MAY 1981. PART 1 (PROMPT REPORTS). DATA FOR APRIL 1981, MARCH 1981
Helen E. Coffey, ed. May 1981 178 p
(PB81-246688; SGD-441-Pt-1; NOAA-81071301) Avail: NTIS HC A09/MF A01 CSCL 03B

Data for April 1981 on alert periods, daily solar indices, solar flares, solar radio emission, solar wind measurements, inferred interplanetary magnetic field polarities, mean solar magnetic field, and Boulder Geomagnetic Substorm Log are provided. Data for March 1981 on daily solar activity centers, solar radio emission, cosmic rays, geomagnetic indices, and radio propagation indices are also provided. Late data includes coronal holes March 1981, geomagnetic indices February 1981 and Solar Proton Event April 1981 (Provisional). GRA

N82-16038# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 441, MAY 1981. PART 2 (COMPREHENSIVE REPORTS). DATA FOR NOVEMBER 1980
Helen E. Coffey, ed. May 1981 60 p refs
(PB81-246696; SGD-441-Pt-2; NOAA-81071302) Avail: NTIS HC A04/MF A01 CSCL 03B

Data for November 1980 on solar radio emission, solar X-ray radiation, and mass ejections from the Sun are provided. A new schedule will cause the Daily Flare Index and the Regional Flare Index to appear 13 and 14 months from the date of observation. Publication of the Abbreviated Calendar Record is being suspended indefinitely. Some other sources of Data are listed, including solar protons. GRA

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

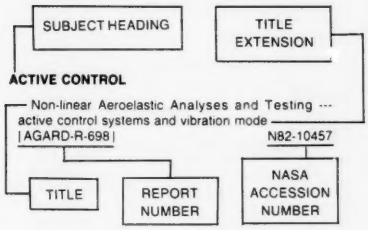
N82-16039# Kiel Univ. (West Germany). Inst. fuer Reine und Angewandte Kernphysik.
A COSMIC RAY EXPERIMENT ON BOARD THE SOLAR PROBES HELIOS 1 AND 2 (EXPERIMENT NUMBER 6) Final Report, Dec 1980
Horst Kunow, Gerd Wibberenz, Guenter Green, Horst Hempe, Bernd Iwers, Reinhold Mueller-Mellin, Manfred Witte, Joachim Fuckner, and Armin Popp (Dornieer-Werke GmbH, Friedrichshafen, West Germany) Bonn Bundesministerium fuer Forschung und Technologie Aug. 1981 118 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie
(BMFT-FB-W-81-016; ISSN-0170-1339) Avail: NTIS HC A06/MF A01; Fachinformationzentrum, Karlsruhe, West Germany DM 24.80

The HELIOS Cosmic Ray Experiment (E6) is a newly developed instrument to measure high energy charged particles of solar, planetary and galactic origin in the inner solar system. Electrons above 0.3 MeV, protons and heavier nuclei up to Neon with energies above 1.3 MeV/N can be separated. The sensor is a telescope consisting of semiconductor-, Cerenkov- and Scintillaton detectors. The complex data processing system onboard and on ground was developed for optimum use of the very restricted telemetry capacity of the space probe. The properties of the instruments are discussed in detail, followed by short descriptions of the mission, the data evaluation, and the spectrum of scientific results. Author

99 GENERAL

No abstracts in this category.

Typical Subject Index Listing



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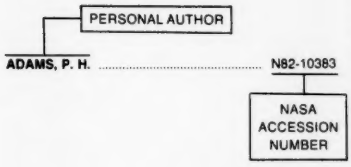

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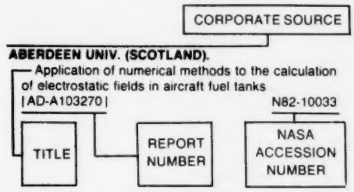

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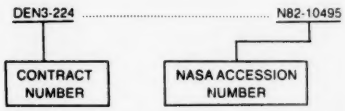

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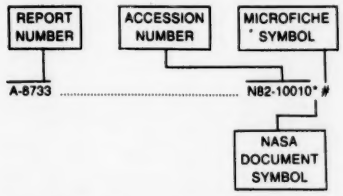

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